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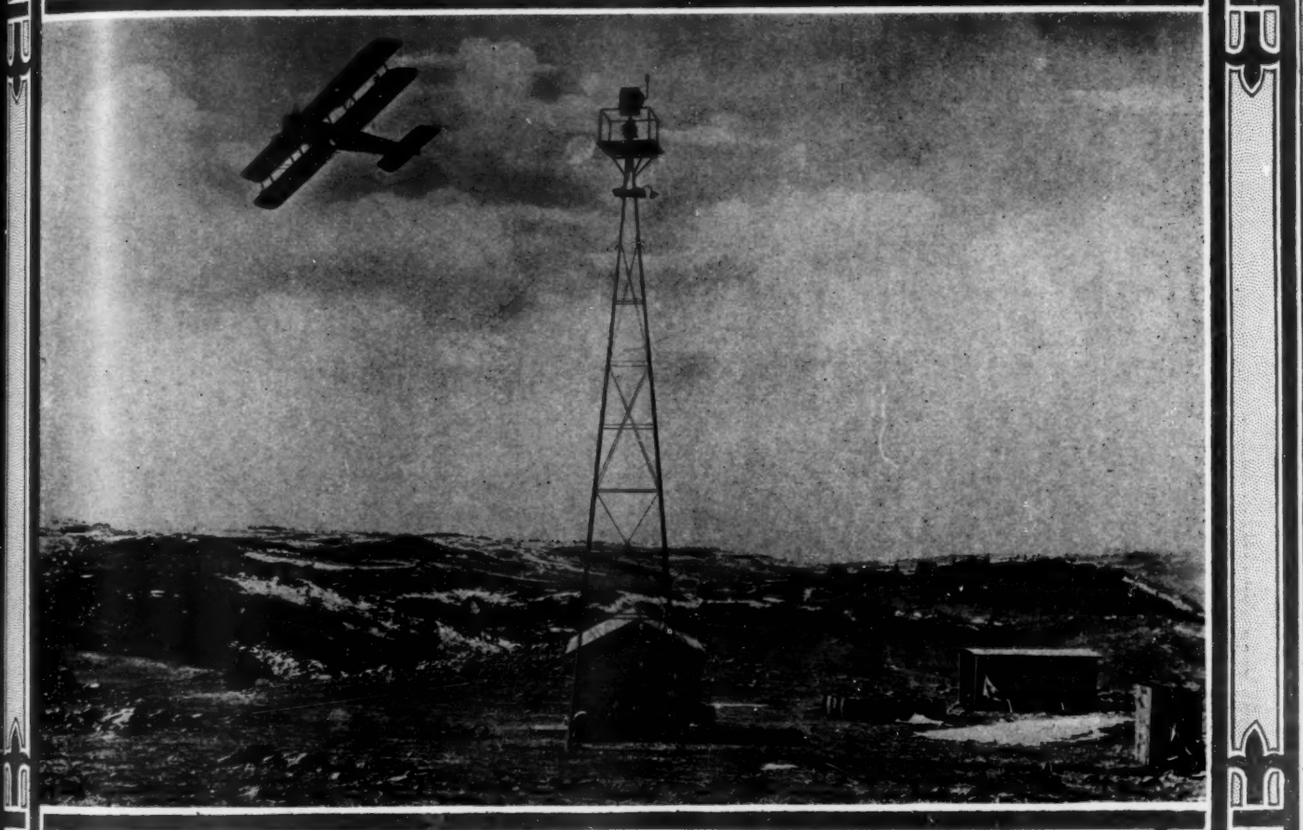

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NUMBER 25

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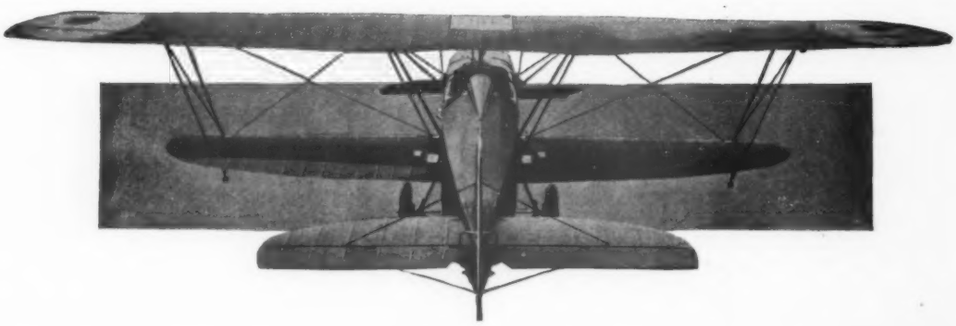

DECEMBER 22, 1924

AVIATION

VOL. XVII. NO. 25

Published every Monday

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The World's Flying Records

Airplanes

3 Kilometers—266.59 m.p.h. Nov. 4, 1923, Lt. A. J. Williams, U.S.N., ***Curtiss-Navy Racer and Curtiss D12A Engine***

Max. Duration—36 hrs. 4 min. 34 sec. April 16, 1917, Lt. O. G. Kelly and Lt. J. A. Macready, U.S.A.

100 Kilometers—243.81 m.p.h. Oct. 6, 1923, Lt. A. J. Williams, U.S.N., ***Curtiss-Navy Racer and Curtiss D12A Engine***

Altitude with Light Load—36,555 feet October 30, 1923, by Sadi Lecointe, Issy-Les-Molineau, France

200 Kilometers Triangular Course—243.67 m.p.h. October 6, 1923, Lt. A. J. Williams, U.S.N., ***Curtiss-Navy Racer and Curtiss D12A Engine***

Seaplanes

200 Kilometers Triangular Course—177.29 m.p.h. October 25, 1924, Lt. R. A. Ofstie, U.S.N., ***Curtiss-Navy Racer and Curtiss D12A Engine***

Altitude with Light Load—29,462 Feet March 11, 1923, Sadi Lecointe, Meulan, Seine-Oise, France

100 Kilometers—176.82 m.p.h. Oct. 25, 1924, Lt. R. A. Ofstie, U.S.N., ***Curtiss-Navy Racer and Curtiss D12A Engine***

Max. Duration—20 hrs. 28 min. Oct. 10, 1924, Lts. Wead and Price, U.S.N., ***Curtiss CS2 Seaplane***

3 Kilometers—189.66 m.p.h. Oct. 25, 1924, Lt. G. Cuddihy, U.S.N., ***Curtiss-Navy Racer and Curtiss D12A Engine***

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VOL. XVII DECEMBER 22, 1924 No. 25

Rewarding the World Fliers

REPRESENTATIVE RATHBONE has introduced in Congress a bill which aims to give each of the Round the World Fliers $10,000. in cash, marked promotion in rank and the Congressional Medal of Honor. It is intimated from the War Department that such a measure is not favored by the rank and file of the Army. It is argued that the World Flight was in regular line of duty and that it would tend to disrupt the services if the participants were singled out and placed ahead of others in the service who would have done the same thing had they had the opportunity.

From the purely theoretical point of view this is perhaps correct. Personnel should do their duty as a matter of course and not because they expect special rewards. However, the world fliers went beyond the ordinary line of duty in their trip around the world. They encountered and overcame hardships of a most unusual kind. It would then seem fitting that these men should receive some extra reward for the dangers which they underwent. There is no man in the Air Service, and there should be no officer in the Army, to grudge the world fliers any reward which may be given to them. The circumnavigation of the globe brought great renown to the Army and the morale of the men in the service would be improved rather than lowered if the men who accomplish such feats are recognized.

If in civil life a company should ask its employees to accomplish a difficult and dangerous task, and the employees should accomplish it with distinction and bring great renown to the concern, it would indeed seem an ungrateful spirit if the men were given no reward or promotion. Army and civilian life are different, but they are both dealing with men and it is hard to understand the mentality of those officers who refuse any recognition for the men who flew around the world.

The Rathbone bill will probably cause a renewal of the discussion as to a separate list for the Air Service. This is the one Service where peace has casualties comparable to war. Vacancies caused by Service duties should be filled by advancing men in the flying branch of the Army, not in the Infantry, Quartermaster Corps, or other Services. The Round the World officers' promotion may bring this important question to the attention of the public and of official Washington.

Aircraft Construction Requirements

FEW persons outside of aviation realize that the American aircraft industry is made up of two fairly distinct classes of factories. One class is chiefly operated for the construction of aircraft to Government orders, and has to conform in matters of inspection and selection of material to the exacting Government standards. The other class of aircraft factory devotes its main efforts to the production of commercial and sport planes, either from original designs or by re-building war surplus equipment, and only in rare instances receives a small experimental order from the Government.

The reason why one class does not encroach upon the work of the other is easy to find. The Government requirements for aircraft design, materials and workmanship are so exacting that the production of such ships is extremely costly. This is as it should be in the case of aircraft which are used by the Services under operational conditions far more strenuous than those applying to civilian aircraft. The critical attitude of Government aircraft inspectors toward private manufacturers further increases the cost of such aircraft in that it often causes definite rejection of material and parts which could be used with entire safety for other purposes.

If commercial aircraft were to be manufactured under such requirements the cost would be prohibitively high. Consequently, only few of the larger aircraft manufacturers engaged in government aircraft production are building commercial planes. Many of them hardly dare to do so, for the prices at which they could expect to sell commercial aircraft would have to be much lower than those they charge the Government, and the latter might then inquire into the reason for such a discrepancy.

Much is said about the Government encouraging Civil Aviation. Yet, from the above it is evident that the Government is doing just the reverse. As there appears to be no remedy for this state of affairs, it seems that it will be necessary to encourage the two classes of aircraft manufacturers in order to secure a satisfactory development of both types of aircraft, civilian and military.

The New World Speed Record

THE new world straightaway speed record of 278 mi./hr. which was made by the French pilot Bonnet affords a timely warning that to keep the world's air records requires ceaseless efforts of a country.

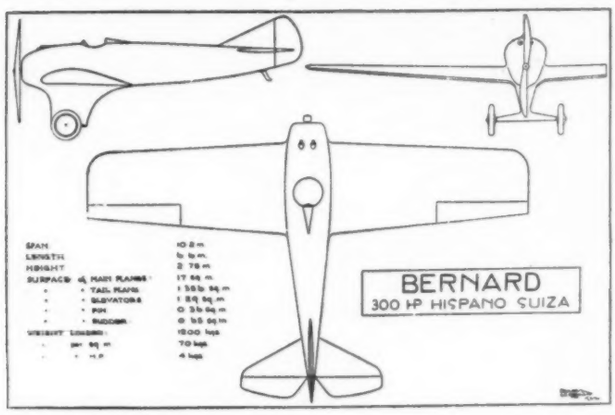
Until about the middle of this year the United States held the overwhelming majority of world records, including the four which head the list as being by far the most important of all—straightaway speed, maximum duration, maximum distance and altitude. Since then, France has been making a determined, and largely successful, effort to recapture these records. As a result, today France holds in addition to sundry other world records three of the four major world records: straightaway speed with 278 mi./hr., maximum duration with 37 hr. 59 min., and maximum altitude with 39,376 ft.

The conclusion to be drawn is that we are gradually slipping behind and that we will slip even further if no special effort is made to regain our lost position. How this is to be achieved, requires careful thought on the part of the aircraft industry and the Government.

France Regains World Maximum Speed Record

Pilot Bonnet on Ferbois Monoplane with 450 hp. Hispano-Suiza Engine Makes 278.38 mi.-hr. Over 3 km. Course

The world's straightaway speed record over a 3 km. course, 266.6 mi./hr., which was made Nov. 4, 1923, at Mitchel Field, L. I., by Lieut. A. J. Williams, U.S.N., on a Curtiss Navy racer, was exceeded by almost 12 mi./hr. on Dec. 11, in France. The new speed mark is, according to a cable received by AVIATION from the Lamblin company, 449 km./hr. (278.38 mi./hr.). It was made at Istres airdrome, near Marseille, by Warrant Officer Bonnet of the French army air



From *The Aeroplane*

Outline drawings of the original Ferbois (Bernard) all-metal pursuit plane

service on a Ferbois monoplane equipped with a high-compression 450 hp. Hispano-Suiza engine—which develops about 600 hp. at 2000 r.p.m.—Levasseur-Reed propeller and Lamblin radiator. Official recognition of the new speed mark as a world's record is dependent upon the International Aeronautic Federation, but as two officials of the Aero Club of France officially observed the performance, there is no doubt that it was authentic.

Characteristics of the Record Breaker

The record breaking ship is one of two which were developed for the 1924 Beaumont Cup race by the Société Industrielle des Métaux et du Bois of La Courneuve, near Paris, which firm is indifferently referred to as S.I.M.B., Ferbois or Bernard.*

This ship which could not be completed in time for the race, has a wing area of 130 sq. ft., measures 31 ft. 8 in. in span and 22 ft. 2 in. in length, and weighs loaded 2110 lb.

The other Ferbois racer was fitted with a 450 hp. Lorraine-Dietrich engine, had a wing area of 162 sq. ft., and weighed loaded for the race 2310 lb. Both ships have the general outline of the Ferbois all metal pursuit plane which is illustrated herewith, except that the landing gear has two legs instead of a central mast. In the Lorraine-engined ship the landing gear is retractable, and wing radiators are used.

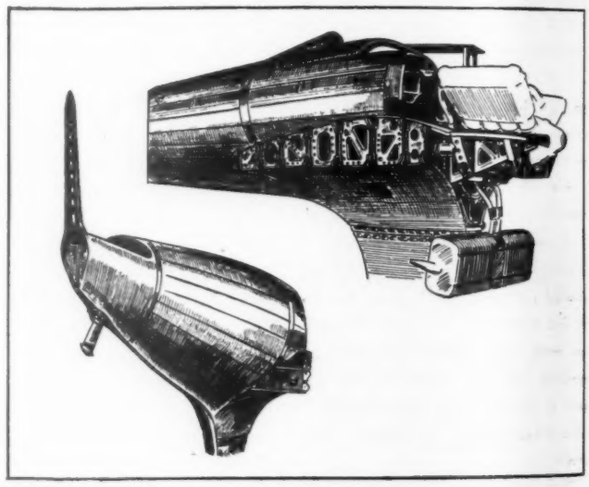
Constructionally the two racers are also very similar. The wings have four wooden box spars and are covered with plywood, the covering supporting about 20 per cent of the total flying load. The fuselage is also constructed of wood, with a plywood skin. The Lorraine-engined ship was prevented from taking part in the Beaumont Cup race by a forced landing in which the ship turned over prior to the race. The accident was attributed to the limited vision the pilot had from the cockpit.

*"Ferbois" is a trade name coined by the contraction of the words *iron* and *wood*, in French, as the firm is engaged in the industrial application of metal and wood products. M. Adolphe Bernard is the president of the S.I.M.B., and M. Hubert, whose name is sometimes used to designate the Ferbois monoplane, is the chief aeronautical engineer.—EDITOR.

In connection with the record breaking Ferbois racer, much interest attaches to the all-metal pursuit plane which this firm has been developing for the past two years. While this ship differs constructionally from the racer, the fundamental idea back of the design is identical in both cases, and may be expressed in the slogan, "maximum streamlining."

The Ferbois Pursuit Plane

The Ferbois monoplane made its first appearance in public at the Paris Aero Show held in December, 1922, where its wonderfully all-inclusive streamlining was generally admired. Reference to the accompanying outline drawings will show to what an extent parasite resistance is reduced on this ship. Cantilever monoplanes readily lend themselves to streamlining owing to the absence of external wing bracing, but little headway has so far been made in this direction with landing gears. Even in ships like the Dornier Komet or the Focke Wulf, where the wheels are carried on two streamline cantilever struts projecting from a deep fuselage, there are too many broken lines in the ensemble to get the best results out of streamlining. But the Ferbois monoplane is really perfect in this respect. The fuselage simply tapers out on the bottom into a streamlined mast, which again flares out into a streamlined axle carrying the wheels. Those engineers who can visualize the flow of an airstream around a given body will



From *L'Aeronautique*

Constructional features of the fuselage of the Ferbois all-metal pursuit plane—top, seen from the side; bottom, seen from the rear

promptly appreciate what this elegant solution means from the viewpoints of lessened head resistance and performance.

Of course, it is possible to build such a perfectly streamlined airplane that its production and maintenance costs become prohibitive. In this respect it seems that the Ferbois, as originally shown at the 1922 Salon was open to serious criticism. However, during the succeeding eighteen months, M. Hubert, chief engineer of the S.I.M.B., undertook the second part of the work he had planned—that of "industrializing" the design of the Ferbois—and that in successive models the construction will be greatly simplified to facilitate quantity production as well as maintenance without the aid of special tools. Particular attention has been paid to quick assembly and dissembly as well as to repairs of the duralumin skin which covers the entire ship.

Fundamentally, the Ferbois monoplane is built up around a central framework, constructed as a unit, which carries the

principal masses of the ship—the engine, the fuel and oil tanks, the armament and the pilot. Onto this framework are mounted the wings, the fuselage proper, and the landing gear framework, which latter is again a unit.

The wings are of fairly thick section, being 13 in. thick at the roots from where they taper toward the tips. The wing beams are box girders consisting of straight flanges and trellis webs, the latter being sheet metal stampings. Duralumin is the metal employed throughout the construction, both in the internal structure elements and in the skin, which latter carries part of the load. The ribs are also stampings. The wings are quickly detachable.

The fuselage is of nearly circular section in front, except for the bottom which continues the sharp line of the landing gear back to the sternpost. The duralumin skin is riveted onto a number of sheet duralumin bulkheads and stringers which run the whole length of the fuselage. The skin is 0.5 mm. thick and is applied in flanged strips which are internally riveted. The fuselage is built in two sections to facilitate repairs and transportation.

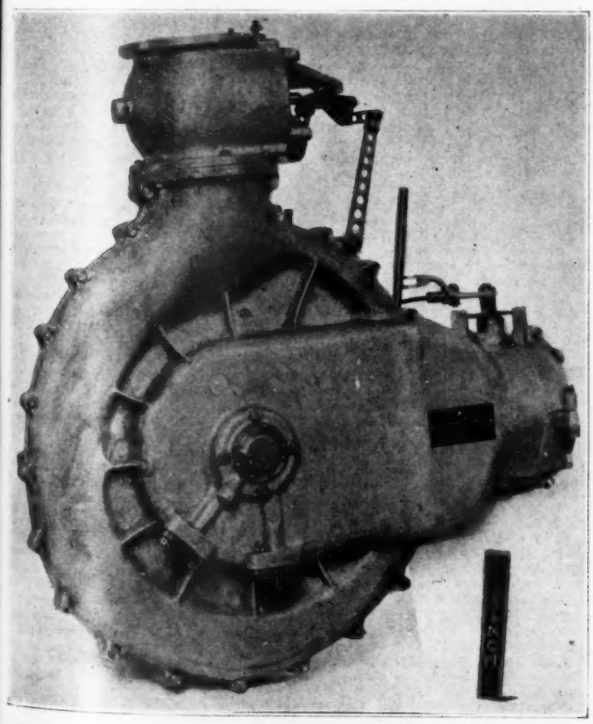
The Central Framework

The central framework is essentially built up of two longitudinal and seven transverse plates of sheet duralumin, which are latticed and flanged for strength and lightness. The longitudinal plates serve as engine bearers and also offer bearing points for the fuel tank and the pilot's seat. The transverse plates are in the form of an irregular polygon, two sides of which form the lower Vee of the fuselage, where it fades into the landing gear structure. The lateral sides of this polygon form the wing roots. Some of this interesting construction may be seen in an accompanying sketch.

To this central framework is bolted the landing gear framework, which is also built up of flanged and latticed plates, with a duralumin skin. The two units can readily be disconnected by undoing a few bolts.

The tail surfaces are mounted without any external bracing. All control leads are internal. On the latest model of this ship the ailerons are hinged in an oblique plan, and not parallel to the wing spars as is shown in the outline drawings. The stabilizer is adjustable.

The 300 hp. Hispano engine is completely enclosed in a cowling, the streamline of which is only slightly marred by the front part of the cylinder banks. The fuel tanks are mounted underneath the engine. Cooling of the engine is insured by a Lamblin radiator mounted in front of the landing gear mast, as shown in the sketch.



Gear driven supercharger, produced by the General Electric Co., designed for flights at 35,000 ft. altitude

Liberty type supercharger of the General Electric Co., installed on a DH4 plane of the Air Service Engineering Division

Static tests of the Ferbois monoplane show that the safety factor of the wings is 18, and that of the landing gear 5. In the static test of the fuselage the empennage carried a load of 80 lb./sq. ft. without giving way.

Some of the specifications of the Ferbois monoplane will be found in the accompanying outline drawings, which are taken from *The Aeroplane,* and which refer to the ship exhibited in Paris in 1922. *L'Aeronautique,* referring to the latest type, gives the following figures: Span 36 ft. 4 in.; length 23 ft.; height 9 ft.; wing area 207.7 sq. ft.; weight loaded 2750 lb.

New General Electric Supercharger

The new high altitude supercharger produced by the General Electric Co. of Schenectady, N. Y., two views of which are shown on this page, is the one referred to in these columns a few weeks back. This new equipment, which was supplied to the Army Air Service, is designed for flights at 35,000 ft. altitude, as against 20,000 ft. which is the standard altitude of the majority of superchargers.

The General Electric Co. recently received an order from the Army Air Service for fifteen turbine superchargers operating at 20,000 ft. altitude, which are similar to seventy previously supplied. It was the satisfactory operation of the latter that lead to the re-order.

Regarding a Unified Air Force

While the Secretary of War has made no statement regarding the unifying of the Army, Marine and Naval Air Services, he is said to feel that such a move would have advantages as well as disadvantages, both of which should be taken into consideration. The War Secretary feels that the same idea could well be carried out in other branches of the miltary service. A recent instance—the proposal to make the leader of the Army band a Captain, because the leaders of the Naval and Marine Bands have the rank of captain—was cited in this connection.

Winslow Bill Before Congress

Congressman Winslow reintroduced the Civil Aeronautics Act on Dec. 9, including in it the greater part of the amendments shown in the confidential recommendation of the Committee, reported last spring.

The Tenth Annual Report of the N.A.C.A.

A Comprehensive Outline of the Present State of American Aeronautics

The tenth Annual Report of the National Advisory Committee for Aeronautics contains a summary of governmental conditions that is of the greatest interest at this time. It deals with the present state of technical development; the functions of the various government air services; the efforts toward cooperation, and finally gives a very exhaustive statement of government policy.

President Coolidge, in transmitting the report to Congress, commended the N.A.C.A. for its now ten year old work in the following terms:

"When the National Advisory Committee for Aeronautics was established by Congress in 1915, there was a deplorable lack of technical information on aeronautics in this country. In submitting this, the Tenth Annual Report of the Committee, I feel that it is appropriate to say a word of appreciation of the high-minded and patriotic services of the men who have faithfully served their country without compensation as members of this Committee and of its subcommittees.

"Through this Committee the talent of America has been marshaled in the scientific study of the problems of flight, with the result that today America occupies a position in the forefront of progressive nations in the technical development of aeronautics. The status of the Committee as an independent Government establishment has largely made possible its success."

CALVIN COOLIDGE

Below will be found extracts covering the principal subject matter of the report.

Present State of Aerodynamics

A study of the present state of knowledge in aerodynamics and the limitations imposed on the performance that can be obtained with the present airplane discloses the lines along which future investigations must be carried out.

The conventional type of airplane is limited in its performance by the following factors: The power-weight ratio, strength of structure, the characteristics of the wing sections, controllability and maneuverability, and unknown facts concerning factors at high speeds and accelerations.

Airplane performance is limited by the strength of the structure in that an increase in strength will mean an increase in weight, unless better methods of construction or better materials are used. This is a problem of the greatest importance, and is so tied up with other factors that its solution depends upon exact knowledge of stresses if the structural weight is to be safely reduced.

To make it possible to compute accurately the stresses in an airplane structure, an exact knowledge of the magnitude and distribution of the loads over an airplane's wings and control surfaces under various conditions of flight must be known. It is imperative that this knowledge be made available, especially for the design of high-speed airplanes of the pursuit type. The load factor used in the design of pursuit type airplanes is 12 and in flight, accelerations of 8 g. have been recorded, indicating how near it is possible to approach a loading which will cause structural failure.

The number of failures of control surfaces also indicates the necessity of an exact knowledge of the loads or forces acting on the control surfaces and their relation to the forces on the lifting surfaces. This information will greatly assist in the development of much-needed design factors for control surfaces.

Control at Low Speed

Control at low speed is a matter of great importance, both for commercial and military types of airplanes, as such control would greatly increase safety in landing and taking off. This subject has received very little consideration in this country, and the problem of increasing the effectiveness of aileron and rudder control at low speeds demands immediate attention.

Associated with the question of control at low speed is the problem of reducing the landing speed. A study must be made of reducing landing speeds by the use of flaps and slots, but in such study consideration should be given to the practical limitation of each device, since aerodynamically a device may give great promise, and yet at the same time involve such an increase in weight or change of structure as to make it impractical.

The present trend of development in airplane design and construction is toward safety and reliability. In the past too much importance has been attached to the obtaining of a high power-weight ratio; in new designs a reserve of power should be provided and the designs should further provide for operation of the engine at a fraction of its maximum power output in normal flight, which will greatly increase the life and reliability of the engine, "the heart of the airplane."

Airplane Structures

The question of the relative merits of biplane and monoplane construction is continually coming up for discussion. In 1923 the monoplane seemed to be gaining in favor, but in the types then constructed so much difficulty with fluttering of the wings was encountered at high speed that the trend of American design is definitely away from monoplanes. To avoid wing flutter at high speed, a monoplane wing must be built extremely rigid in torsion, which requirement practically makes necessary the use of either a metal or wooden covering for the surface of the wing.

In this country there is also a strong preference for the biplane in design for the slower military types of observation and bombing airplanes. Wing flutter is not likely to give trouble here, but there are other considerations which favor the biplane. In the first place, it is rather difficult to secure good lateral control in monoplanes; secondly, the wing structure can usually be built with less weight in a biplane; and thirdly, the biplane gives a more compact airplane which takes up less hangar space and is more easily handled. This latter point is of particular importance in the design of naval aircraft which have to be handled aboard ship.

As a commercial airplane, the monoplane seems to be a preferred type, especially for passenger carrying. This is no doubt due to the fact that with a monoplane wing placed near the top of the fuselage, it is possible to arrange the seating of the passengers so as to give an unobstructed view below the airplane.

Materials—Metal Construction

A considerable advance has been made in the application of metal construction to aircraft in spite of the fact that progress has been retarded by the high cost of experimental work and the scarcity of orders for metal aircraft in quantity.

Today it is common practice to use metal for the structural members of the landing gear and the tail surfaces although the fabric covering of the surfaces has usually been retained.

In most of the recent designs metal construction of some sort has been used in the fuselage. A framework of mild steel tubes with a fabric covering is the most common type. There is much variation in the details of the fuselage frames, some designers use wires for their diagonal bracing, some use tubes throughout; some make all joints by welding while others weld the vertical and diagonal members to fittings which are pinned and sweated to the longerons. The surprising thing is the bold dependence upon welding for the security of important joints. Welding is being used today as a matter of course in places where a few years ago its use would be prohibited.

Fuselages of steel tube construction are more durable than the old wood and wire construction, offer better protection to the crew in the case of a crash, and are cheaper to construct. They do not afford, however, any material saving in weight. Duralumin construction is more promising in regard to reducing weight and a number of different types are being tried out including both the tubular truss construction and the shell type of construction consisting of a duralumin skin which is backed up with internal framing.

The extension of metal construction to wings has lagged behind fuselages possibly because the conventional wood and fabric combination has proved very satisfactory for the climatic conditions under which American airplanes operate. Then too, the problem is a more difficult one. A number of experimental wings has been constructed using steel or duralumin for the principal members, some with the fabric covering and others with a duralumin skin. None has been built in quantity, however, except the MO1 wings which have built up duralumin girders for the wing beams and use wooden ribs and fabric covering. An increase in the use of metal for wings is to be anticipated, especially in the heavier types of aircraft. Duralumin is likely to be the chief metal used.

Aircraft Engines

The successful progress in aircraft development is reflected in the fact that we now have in this country eight proved engines in horsepowers ranging from 60 to 800.

The development of engines is in three stages: the experimental stage, the flight test stage, and the production stage.

For a horsepower range of 60 to 200 there is available the Wright "Gale," aircooled, three cylinder radial 60 hp. engine, the Wright "Whirlwind" aircooled, nine cylinder radial 200 hp. engine, and the Wright "Tempest" watercooled eight cylinder 200 hp. engine.

All these engines are in the production stage and are proved engines.

From 200 hp. to 400 hp. the Curtiss D12, a twelve cylinder water cooled engine, is in the production stage and has given an excellent performance, especially in pursuit type airplanes.

From 400 hp. to 500 hp. two engines are available, the proved Liberty 12 and the Packard 1A1500. The latter engine is still in the flight test stage and gives every indication of being one of the most reliable and lightest engines ever developed.

The Wright "Tornado" twelve cylinder T3 engine answers present requirements for horsepower from 450 to 600. This engine is in the production stage.

From 600 to 800 hp. the Packard 1A2500 twelve cylinder watercooled engine answers present requirements. Its performance is excellent and its weight per horsepower low. It is still in the experimental stage, however.

Two 400 hp. radial aircooled engines are in the experimental stage. The two engines are being developed by different engine builders.* The tests of these engines in service will answer the question of whether the 400 hp. radial aircooled or the 400 hp. watercooled engine is better suited for certain military types of aircraft.

In the development of new engines for the services there seems to be no immediate demand for high power engines over 1000 hp. The new development will be along lines of improving present types with a view to increasing reliability and decreasing the weight per horsepower.

Airships

The technical development of airships during the past six years, both from an aerodynamical and constructional standpoint, has been steady and the progress satisfactory. In experimental research with reference to improved design and operation of airships, the United States has now taken the lead.

The technical staff of the Bureau of Aeronautics has developed satisfactory design theories for the general design of the structure of rigid airships as embodied in the Shenandoah.

The Engineering Division of the Army Air Service have supervised the design and construction of the R81, a large semi-rigid airship now nearing completion.

The National Advisory Committee for Aeronautics at the request first

*By the Curtiss and Wright companies, respectively.—EDITOR.

of the Bureau of Aeronautics and later of the Army Air Service appointed special airship committees to report on the design and construction of both rigid and semi-rigid airships. The work of the two companies is the first intensive study of the airship by competent engineers not directly connected with an airship problem as such.

In the course of the airship development program, an extensive series of tests were carried out by the Bureau of Standards to develop accurately the properties of the various parts of rigid airships. Further, the design theories developed have been supplemented by tests of a photo-elastic model of the structure of a rigid airship, and further confirmation of those theories has been found in the results of a series of strain gage measurements carried out on the Shenandoah.

One of the fields in which the greatest progress has been made has been the determination of the magnitude of the aerodynamic loads encountered by airships. These experiments have produced a wealth of valuable information, laying the foundation for the designer in determining the aerodynamic loads on airships.

When the construction of a rigid airship was undertaken by the Navy one of the most difficult problems faced was the production in this country of duralumin, the aluminum alloy so successfully used in the construction of the German airships. Due to the efforts of the Navy duralumin is now being successfully made and its manufacture is now established on a solid footing.

Next to duralumin the most difficult material to obtain was the fabric used in making gas cells for airships. Such a fabric had never been made in this country prior to the construction of the Shenandoah. There are now two factories with trained personnel competent to manufacture this type of fabric in quantity. In addition substitutes for the goldbeater's skin, used in gas cell construction, have been found and two types give promise of success.

The problem of producing an airship engine in this country has been solved and there are now available two models of eminently satisfactory engines.

Helium Production

The development of helium production facilities has proceeded rapidly although most of the effort has been expended on the actual production. Many valuable improvements in the process of extracting the helium have been developed and as a result it is possible to predict more efficient production at a lower cost.

With the use of helium it was necessary to develop a method for preventing the valving of the helium as the airship became lighter due to the consumption of fuel. A successful method of water recovery from the exhaust gas from the engine is now in operation.

The present status of airship development should not blind us to the necessity for further research. In particular, there still remains much to be known regarding the loads encountered by airships in flight. Full-size tests on the Shenandoah and the Los Angeles should be made to determine the aerodynamic loads. At the same time a study should be made on the structure of the airship by means of strain gages. These studies are of especial importance in view of the probability that future airships will have capacities of 5,000,000 cu. ft. and more.

Army and Navy Policy Relating to Aircraft

The following policy of the Army and Navy relating to aircraft has been approved by the Joint Army and Navy Board and by the War and Navy Departments, and has been published to the services for their information and guidance.

"Aircraft to be used in the operations of war shall be designated: (a) Army aircraft; (b) Navy aircraft; (c) Marine aircraft.

"Army aircraft are those provided by the War Department and manned by Army personnel.

"Navy aircraft are those provided by the Navy Department and manned by Navy personnel.

"Marine aircraft are those provided by the Navy Department and manned by Marine Corps personnel.

"The marine air service is a branch of the naval air service.

"The functions of the Army, Navy, and Marine aircraft are as follows:

"*Army aircraft.* Operations from bases on shore—

(a) As an arm of the mobile Army;

(b) Against enemy aircraft in defense of all shore establishments;

(c) Alone or in cooperation with other arms of the Army or with the Navy, against enemy vessels engaged in attacks on the coast such as—

(I) Bombardment of the coast;

(II) Operations preparatory to or of landing troops;

(III) Operations such as mine laying or attacks on shipping in the vicinity of defended ports.

"*Navy aircraft.* Operations from mobile floating bases or from naval air stations on shore—

(a) As an arm of the fleet;

(b) For overseas scouting;

(c) Against enemy establishments on shore when such operations are conducted in cooperation with other types of naval forces, or alone when their mission is primarily naval;

(d) To protect coastal sea communications by—

(I) Reconnaissance and patrol of coastal sea areas;

(II) Convoy operations;

(III) Attacks on enemy submarines, aircraft, or surface vessels engaged in trade prevention, or in passage through the sea area.

(e) Alone or in cooperation with other arms of the Navy, or with the Army, against enemy vessels engaged in attacks on the coast.

"*Marine aircraft.* The functions normally assigned to Army aircraft shall be performed by the Marine aircraft when the operations are in connection with an advance base in which operations of the Army are not represented. When Army and Marine aircraft are cooperating on shore, the control of their operations shall be governed by the one hundred and twentieth article of war, United States Army.

"The functions of aircraft assigned under Army (*c*) and Navy (*c*) are a duplication of functions. In such operations cooperation is vital to success. Such cooperation shall be governed by the following provisions:

(a) The naval district forces, vessels and aircraft, will never be strong enough to prevent an attack on the coast by major units of the enemy fleet. When, therefore, an enemy force of a strength greatly superior to that of the naval forces available for use against it, approaches the coast, the commander of the naval force shall inform the commander of the Army department of the situation; shall assume that the Army has a paramount interest in the operation, and shall coordinate the operations of the naval forces with those of the military forces.

(b) If, however, the conditions are such that the enemy is, or can be, engaged by a naval force approximating in strength to that of the enemy, the commander of the Army department shall be so informed and he shall assume that the Navy has a paramount interest in the operation and shall coordinate the operations of the military forces with those of the naval forces.

"The functions of aircraft above assigned, shall govern in the production of aviation equipment, training of aviation personnel, and establishment of air stations for the War and Navy Departments. Such assignment shall not prevent the employment of Army and Marine aircraft in naval functions upon the request of the senior naval officer present or vice versa, the employment of naval aircraft in Army functions upon request of the senior Army or Marine officer present on shore; nor shall it prevent the employment of Army, Navy, or Marine aircraft when no other air service is cooperating in the operation, in any manner which shall be most effective in accomplishing the mission of the force.

"All questions regarding the policy of the War and Navy Departments with regard to the tactical and strategical functions of aircraft, and to the location of air stations, shall be addressed to the Joint Board for consideration and recommendation to the Secretary of War and the Secretary of the Navy."

Increasing Importance of Aircraft in Warfare

The Limitation of Armaments Conference held in Washington in 1921-1922, on invitation of President Harding, examined into the possibility of limiting aviation development for war purposes and limiting the use of aircraft in warfare. A special committee of aviation experts representing the United States, Great Britain, France, Italy, and Japan, was appointed. That committee submitted a report which reviewed the situation at length. The "Final Conclusions" of the report follow:

> "The committee is of the opinion that it is not practicable to impose any effective limitations upon the numbers or characteristics of aircraft, either commercial or military, except in the single case of lighter-than-air craft. The committee is of the opinion that the use of aircraft in warfare should be governed by the rules of warfare as adapted to aircraft by a further conference which should be held at a later date."

The fact that the Limitation of Armaments Conference placed no restriction on the development and application of aircraft for war purposes assures the greater relative importance of aircraft in future warfare. It is a maxim of military science, that an army and a nation must be adaptable to changes in time of war. The best-laid plans, whether for offensive or defensive warfare, are usually upset either by the success of the enemy or by changes and developments in the art of warfare. No one can foretell at this time what the use of aircraft will be in future wars, not even in the next war. It is safe to say that there will be individual and group fighting in the air; there will be aircraft attacking troops on the ground, both with bombs dropped from great heights and with machine guns mounted on low flying aircraft protected by armor from ordinary rifle bullets; there will be bombing of large cities, military and manufacturing centers, and routes of communication and transportation. And it has been proposed that aircraft be used to drop poisonous gases, not only on the enemy troops but also behind the lines and in the centers of population, to the same extent that long-distance bombing will be carried on. The bombs carried may not be limited to explosives and poisonous gases but may possibly be loaded with germs to spread disease and pestilence. Without limitations on the uses of aircraft in warfare, a nation fighting with its back to the wall cannot be expected to omit to use desperate means to starve off defeat. The uses of aircraft in warfare would then be limited only by the inability of human ingenuity to conceive further uses for this new agency of destruction.

Rules Restricting Aircraft in War

A conference was held at The Hague in 1923, attended by delegates of the United States, which drafted rules and regulations covering the use of aircraft in war. There was evident a tendency to minimize as much as possible aircraft attack upon centers of population with the resulting consequences to non-combatants and to restrict such attacks to what are military objectives. In spite of the rules thus formulated and even if they should be universally adopted, it is still inevitable that aircraft attacks would greatly terrify and undoubtedly seriously injure and damage many who have heretofore been classed as non-combatants.

It is believed quite probable that if the nations of the world do maintain adequate air forces, this may tend to the adjustment of international disagreements by conference, as the delegates to such conferences will have the strong backing of their national air forces capable of such destructive effect as that indicated above. When wars were fought within a limited territory by ground troops, the national patriotism of non-combatants strongly supported their armed forces, but in future wars when air power becomes a most vital factor in national defense, theaters of operation will no longer be limited to restricted territories and non-combatants will probably and unavoidably be subjected to far greater personal damage and injury than in the past. It is not inconceivable that such pressure will be brought to bear upon the governments concerned by their non-combatants, following a series of aircraft raids, that an early cessation of hostilities will be more earnestly desired by the people on both sides and will be forced by popular demand upon the nation least efficient in air power.

Aviation has made itself indispensable to military and naval operations. Under our present organization, where the function of national defense is vested principally in the War and Navy Departments, we must look to those departments to develop the possibilities of aviation in warfare, whether to be used in conjunction with military and naval operations, or to be used independently for attacking distant points behind the enemy's lines, or elsewhere. The problem of the air defense of this country is worthy of most careful study.

The Aircraft Industry and Its Relation to National Defense

The present American aircraft industry is but a shadow of that which existed at the time of the Armistice. With the great stimulus in aircraft development and performance during the war, the aircraft manufacturers were hopeful that civil aviation would rapidly come into being with a resulting great demand for their product. Civil aviation has not developed as it was hoped it would and this makes the present situation more difficult.

These aircraft manufacturers have had to rely for orders upon Government agencies and the limited amount of governmental purchases has forced a number of manufacturers to go out of the aircraft business. It is a matter of grave Government concern lest the productive capacity of the industry may become so far diminished that there may not remain a satisfactory nucleus. By a "satisfactory nucleus" is meant a number of aircraft manufacturers, distributed over the country, operating on a sound financial basis, and capable of rapid expansion to meet the Government's needs in an emergency.

After the very costly lessons of the war, it would be folly to say that the Government is not concerned with the state of the aircraft industry. It is concerned that there should be in existence, and in a healthy condition, at least an adequate nucleus of an industry. An aircraft industry

is absolutely essential to national defense. One lesson of the war that will not be forgotten is that it takes a great deal of money to develop hastily an aircraft industry from almost nothing. The American people can ill afford to pay such a price a second time. To maintain a nucleus of an industry it has been proposed either that the government substantially increase the volume of its orders for aircraft, or devise a policy for the apportionment of orders at fair negotiatied prices, without regard to competition.

Neither of these propositions, however, in the judgment of the N.A.C.A., goes to the root of the trouble. To substantially increase orders will require substantially increased appropriations. To increase appropriations for the Army and Navy air services because they need more aircraft is one thing, but to increase appropriations primarily to maintain an aircraft industry is something else. Furthermore, the maintenance of an industry in a healthy condition does not involve the maintenance of any manufacturer who has failed to liquidate or reduce his plant and overhead expenses to an appropriate peace-time basis.

In the judgment of the Committee, the existing bad situation in the industry should be substantially remedied. In an effort to help the situation, the Committee suggests the following steps on the part of the industry and of the government:

Steps to be Taken by the Industry:

1st. Every manufacturer intending to remain in the aircraft business and who has not readjusted his war-time plant and overhead expenses to a peace-time basis should do so without further delay.

2nd. The firms comprising the aircraft industry should specialize in the production of various types of aircraft with a view to the more continuous development of types by the same plants and the gradual recognition of proprietary rights in new designs.

Steps to be taken by the Government:

1st. The Army, Navy, and Postal Air Service should agree upon a balanced program setting forth from time to time the probable requirements of the Government for each type of aircraft for at least one year in advance, and should announce the same to the industry for its information and guidance.

2nd Orders for the different types should be placed with the different manufacturers at such intervals as to insure continuity of production and the gradual development of special facilities and skill by each manufacturer in the production of a given type of aircraft.

The Committee does not attempt to say that the method proposed is the ideal solution but it submits that if followed it would produce the following beneficial results:

(a) It would insure the continuous development of types by the same firms which is the most rational method of improving the quality and performance of aircraft to meet special needs.

(b) It would reduce the cost of aircraft.

(c) It would provide all manufacturers with an adequate market to enable them to continue in the airplane business without the periodical menace of dissolution or bankruptcy heretofore caused by long gaps between orders.

Summary

Aviation has been proved indispensable to both the Army and the Navy. Neither can operate effectively without an adequate air service. What was considered adequate in the World War will not do in the future.

The progress in scientific research and in the technical development of airplanes and airships has been continuous and gratifying, but before commercial aviation can become self-supporting, airplanes must be made safer, more controllable at low speeds incident to taking off and landing, where most accidents occur, and less expensive in initial cost and in the cost of maintenance and operation.

Although the problems of rigid and semi-rigid airshaps have been seriously studied during the past two years, there is much to be learned about airships. In the present state of development of rigid airships, as exemplified by the remarkable flights of the Shenandoah from Lakehurst, N. J., to Seattle, Wash., and return, and of the Los Angeles from Friedrichshafen, Germany, to Lakehurst without stop, it is evident that material has reached the point where, with practice and experience, the possibilities in the field of commercial airship transportation can be determined.

The aircraft industry is in a poor condition, but the remedy is within the control of the manufacturers and the governmental agencies concerned. The Committee has proposed a basis for solution of the existing difficulty.

In view of all the circumstances at present affecting the development and use of aeronautics in America and its relation to the public welfare and national defense, the National Advisory Committee for Aeronautics submits the following:

General Recommendations

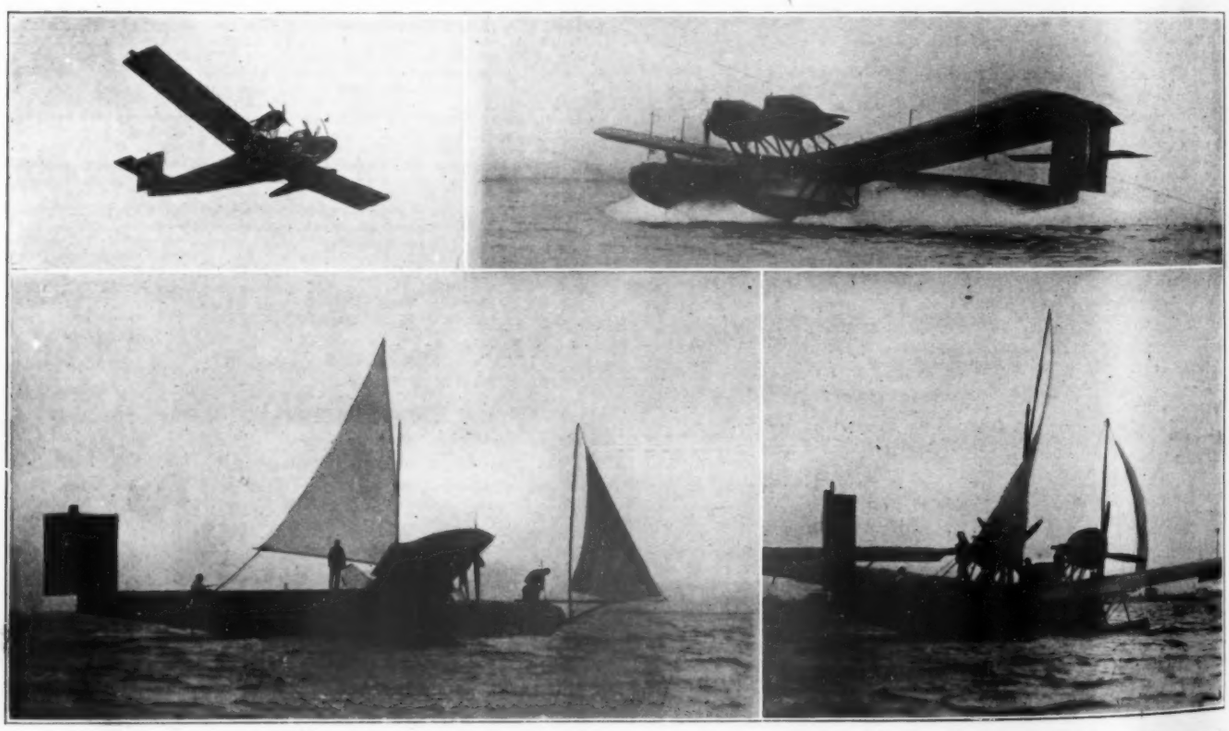
1. *Scientific Research.* The continuous prosecution of scientific research on the fundamental problems of flight should be regarded as in the last analysis, the most important subject in the whole field of aeronautical development, as substantial progress in aeronautics depends upon the continuous acquisition of knowledge which can be obtained only by long-continued and well-directed scientific research.

2. *Air Mail Service.* The Air Mail Service should be continued under the Post Office Department and its ground equipment for night flying should be extended to cover the entire route between New York and San Francisco. When this is done, over-night transportation of mail by aircraft between strategic points, as, for example, between New York and Chicago, should be provided at rates that will make such service eventually self-supporting.

3. *Commercial Aviation.* Rapid development of commercial aviation is primarily dependent upon increasing the reliability and economy of operation of aircraft. Other countries, notably England and France, have encouraged commercial aviation by direct subsidies, and their experience has indicated that unless governmental aid is given, directly or indirectly, commercial air transportation cannot be financially successful in the present state of aviation development. Legislation providing for the reasonable regulation of aircraft, airdromes, and aviators, and affording necessary aids to air navigation along designated national airways, would be most helpful. The establishment of landing fields generally would also stimulate improvement in the reliability and economy of aircraft operation and facilitate the development of commercial air transportation in this country on a sound basis.

4. *Military and Naval Aviation.* There should be continued study of the air defense problem of the United States, and continued support of aviation development in the Army and Navy.

New Pictures of Japan's Latest Naval Air Cruiser, built in Denmark



Four views of the new Rohrbach Ro II duralumin flying boat—in flight, taxiing and sailing under a jury rig. The use of sails by seaplanes for surface navigation in case of total engine failure opens up interesting possibilities

The Future of American Air Racing

By EDWARD P. WARNER

Professor of Aeronautics, Massachusetts Institute of Technology

The time has come to consider all the benefits that air races offer and all the drawbacks and dangers that they entail, and then to choose a policy for the future in the light of all the facts at hand.

The motives which lead to the organization of sporting events on a large scale, or, in those cases where monetary inventive is lacking or negligible, to participation in such events, are various, but in general they can be alliteratively classified under the three heads of sport, spectacle or science. Men risk their lives in climbing inaccessible peaks without expectation of reward and without an audience to applaud and to be thrilled, solely for the joy of combating and overcoming obstacles. In the case of cliffs hitherto unscaled the desire to add to the world's store of geographic knowledge is a factor as well, but in general it is a secondary one. Polo, tennis, football, notable as they are as spectacles in their highest forms, exist primarily as sports and for the pleasure that they give the contestants, and all would be played if no one ever went to see them. Automobile racing on the other hand, and horseracing as well, are spectacles first of all. Many men follow them, of course, for the sport they give, and they have been the source of great advances in the art of automobile design and of great improvement in the quality of the thoroughbred horse, but it is primarily for the delight of onlookers that many of the events are conducted.

Not a Sport to Watch

As a sport, air racing offers comparatively little. Considerations of safety make it impossible to start the machines simultaneously in large groups, and the first man home is therefore not necessarily the winner, and no competitor knows exactly how he stands until after landing and looking at the score-board. Furthermore, there is too little variation in the performance to provide much interest to the contestant. The thing is too perfect, too mechanical. The machine that leads at the end of the first lap will win the race, and that which wins today would win tomorrow, and the next day and every other day, barring accidents, which fortunately happen but seldom. There is no holding back for a sprint, the whole distance is covered at full speed, and that speed is measured for each machine in the first few minutes and thereafter the contest is simply one of endurance.

As a spectacle, an airplane race amounts to even less. Nothing happens, the machines are out of sight most of the time, and when they approach the mark and turn it they do so in such a monotonously uniform manner that the spectacle quickly becomes that of a dreary procession, to be vivified only by examination of the scoreboard. So far as anything which an audience that has already seen some flying gets out of it after the first five minutes is concerned, they might as well be looking at the announcement of results for each lap posted in front of a newspaper office down-town. Thrills are happily infrequent, far less common than in an automobile race, and in no contest in which men and their machines ever meet is the element of competition less directly in evidence.

New Results Disappointing

That leaves but one sound reason for the holding of airplane races, and there is but one sufficiently weighty to justify the organization and conduct of a meet on a grand scale.

Racing of "Jennies" and the like is a harmless pursuit, and provides the pilots with a certain amount of amusement, provided the same competitors do not meet repeatedly, and with a chance to pick up a little prize money, but such events are more or less impromptu in their organization, and draw a purely local attendance. If national or international air races are to continue, they will have to find their justification in definite evidence that they lead to improvement of aircraft. They should serve as the incentive to effort on the part of the aeronautical engineer and as the crucible in which products of real merit are separated from the dross.

They have not done that up to the present time, except in a very limited and increasingly narrow degree. At St. Louis last year the Pulitzer race was again the point of principal interest, with two machines from each of two new designs, but there were in addition to that a variety of commercial and semi-commercial machines of private ownership, on the performance of which no reliable data had theretofore been available. This year, at Dayton, there was nothing new in the Pulitzer race, and little that was new anywhere else except in the light plane events. At least a third of the total time went into the racing of standardized military types, and in two of the races there was no competing machine which had not been designed at least as far back as 1920. From the point of view of an engineer seeking for information, the meet was an almost complete failure.

The national air races are failing to provide that incentive to technical progress which would be the most valid argument for their continuance in their present form.

What Causes the Accidents

The objection to the racing of old airplanes is not that it is dangerous, but simply that it is futile. If the charges which are so freely being made that the fatal accidents to Lieutenant Pearson and Captain Skeel were due to the age of the machines they were flying have the slightest weight, that fact has not yet been demonstrated, and it is unlikely in the extreme that length of service had any bearing on the tragedies. An airplane properly housed and maintained can be in as good condition after five years as on the day that it leaves the shop, and there is no evidence that these were not.

If a single probable cause be sought, it is far more reasonable to ascribe the accidents to the existing rules of the Fédération Aéronautique Internationale and of the National Aeronautic Association, the latter having now been modified, which permitted unlimited diving to gain speed just before the start of a race, records thus being made with airplanes propelled along their paths by the force of gravity. It has been amply demonstrated, even before these accidents occurred, that a small machine with a very high speed can be pulled out from a dive by its pilot with sufficient abruptness and violence to wreck any airplane structure ever built, and if temptation to dive is offered by the racing rules there will inevitably continue to be structural failures so near to the ground that the pilot has no shadow of a chance for his life. Those rules can readily be modified, however, and the results of their present existence are quite aside from the fundamental question of the technical value of the races.

Putting Science First

There are a variety of ways in which air races may be run, and most of them have been tried. The French policy, for example, is to concentrate on competitions of a highly technical nature, the winner of which is determined in accordance with some more or less complex formula involving a number of factors, on cross-country reliability tours and on one pure speed event, the Coupe Beaumont, which is the French analogue of the Pulitzer race. The Coupe Beaumont, however, is allowed to stand on its own bottom. The contest is held at an aerodrome far in the south of France. It is attended by no hippodrome features, and it draws only a very moderate attendance. None of these contests are designed in any way as spectacles. They are intended solely to show what progress the designers of France have made during the past year in the production of airplanes for certain specific purposes and to indicate to French engineers what lines of development are proving most effective. When a crowd is to be entertained, military and civil pilots put on a show which is purely a show,

with exhibitions of stunting and parachute dropping which are exceedingly exciting to those seeing them for the first time. A tri-weekly aeronautical newspaper published in Paris carries notices of such exhibitions in nearly every issue.

In England the general lines followed are not so very different, but more stress is laid on cross-country flying and less on exhibitions. Instead of seeking to attract crowds, they are deliberately shunned. The recent light plane competition under the direction of the Air Ministry, which could very well have been held at one of the flying fields in the neighborhood of London, was removed to Lympne, on the channel coast. When the British held their first competition for commercial airplanes, another event decided on formula and bringing forth exceedingly interesting results, they selected a field seven miles from the nearest hotel, with practically no transportation, and more than three hours from London. Never at any one time were there fifty spectators present, and all of them were aeronautical engineers or representatives of the technical press. The great aerial sporting events of the year are the races for the King's Cup and the Aerial Derby, both of which are run over long cross-country courses.

It should not be understood that this path is being advocated for imitation as a whole. The writer has heard it violently criticized by many men connected with the aeronautical industry in Great Britain, but whether or not we consider it worthy of being copied, it should at least be observed with interest.

The British, like the French, when they give a show, give it simply as that. The Royal Air Force pageant, put on near London each summer, comprises a whole afternoon of exhibition flying of a high order, with such races as are held distinctly secondary in importance and on the gymkhana order rather than real speed tests. For the last two years, incidentally, the pageant has included the display on the ground and in the air of almost all of the Air Force's new machines, a far more generous exhibit of military types than has been vouchsafed to the American public at any meet in this country.

The American Mistakes

Air racing in America, as contrasted with the practices in the other countries mentioned is characterized, as already mentioned, by the introduction of numerous events for machines of standardized type and of considerable age. It is characterized also by the combination of competition with exhibition, and by the making of the most strenuous events to draw large crowds of the lay public to the scene, efforts which have been successful, for although the gatherings at the National Air Races have not always been up to the hopes of the promoters in their size, they have at least reached a magnitude unparalleled at any similar events elsewhere.

But the question is whether the drawing together of a vast throng of the mildly interested is worth the trouble that it costs? Certainly those who attend do not become converts to aeronautics, for no man ever became desirous of riding in an airplane as the result of watching a race, nor are they likely to gain any appreciably improved understanding of what the airplane is and what it can do, except to be sure, in those few districts where flying is still a comparative novelty.

The present method of administering the races need not be continued as a favor to the Army and Navy Air Services, for they find the preparation of special machines for the contest to be a decided burden. Tuning up and streamlining ten DH4's in an identical manner teaches nothing that could not be learned by doing the same work on a single one. It teaches nothing of very much value in any case, and certainly does not justify the time taken from other work. The Air Service has always cooperated splendidly in running these races, doing everything possible to assist both in the organization and in the providing of contestants, but they have helped out only by making a distinct sacrifice in some cases. That sacrifice should not be required of them in the future.

To repeat, the races are not sporting events. A certain amount of risk is always inherent in the flying of very fast machines close to the ground. Pilots should be invited to take that risk only if something is to be learned from the results. There is no occasion for holding an event like the Pulitzer race when no new machines are at hand to compete. In any case, the scale of the National Air Races should be decidedly contracted in the future, and they should be explicitly aimed toward the development of the aeronautical art, without any reference to the provision of a Roman holiday for some single favored community willing to expend a vast sum for the purpose.

Collier Trophy Claims

The Collier Trophy Committee of the National Aeronautic Association will meet on Jan. 16, 1925, to view and pass upon the claims made by various contenders for this trophy.

In order that claims may be heard, it is absolutely necessary that they be in the hands of the Committee not later than Monday, Jan. 12. All claims must be attested before a notary public and seal attached. In case special demonstrations are desired, word should immediately be sent to the Committee, and if possible our representative will be on hand as witness.

Declarations of private tests and demonstrations must be signed by two responsible and representative witnesses. These men shall be outside of the organization of the contender, such as, municipal, military or naval officers or other men of prominence and standing.

The Collier Trophy Committee consists of: Orville Wright, Godfrey L. Cabot, Dr. G. W. Lewis, Porter H. Adams and B. Russell Shaw.

The provisions of the deed of gift read as follows:

"The Collier Trophy, donated by Robert J. Collier, Esq., to be awarded annually by the National Aeronautic Association for the greatest achievement in aviation in America, the value of which has been thoroughly demonstrated by the actual use during the preceding year."

Previous awards of the Collier Trophy are as follows:

1911 To Glenn H. Curtiss for Hydroaeroplane development.

1912 To Glenn H. Curtiss for development and demonstration of the Flying Boat.

1913 To Orville Wright for development and demonstration of his Automatic Stabilizer.

1914 To Elmer A. Sperry for development and demonstration of Gyroscopic Control.

1915 To W. Starling Burgess, for development and demonstration of Burgess-Dunne hydroaeroplane.

1916 To Elmer A. Sperry for development and demonstration of Sperry Drift Set.

This trophy was not awarded from 1917 to 1920 on account of the war.

1921 To Grover C. Loening, for the development and demonstration of his Air Yacht.

1922 To the personnel of the U. S. Air Mail Service for their wonderful achievement in completing a year's operation along the different routes from Coast to Coast without a single fatal accident.

1923 To pilots and other personnel of the U. S. Air Mail Service for successfully demonstrating to the world the practicability of night flying in commercial transportation.

Death of Sacadura Cabral

It is with deep regret that we have to record the death of Capt. Sacadura Cabral, the Portuguese naval aviator who achieved worldwide fame through his flight across the Atlantic ocean from Lisbon to Rio de Janeiro, Brazil, in 1922.

Captain Cabral lost his life on the Belgian coast while flying from Amsterdam, Holland, to Lisbon on a Fokker seaplane in company with two other planes of this make. The fliers soon lost each other from sight in a thick fog. One of them landed at Brest, and the other at Cherbourg, but Captain Cabral did not turn up. His body and the wreckage of his ship were found a few days later in the North Sea, off Ostende.

Captain Cabral, who was forty years of age, had recently completed his plans for a flight across the North Atlantic from Lisbon to Newfoundland. During the war of 1914-18 he served with distinction in the French naval air service.

New Lincoln Standard Sport Plane

Single-Seater Equipped with 35 hp. Anzani Engine Combines Performance and Economy

A new one-place sport plane equipped with a 35 hp. 3 cyl. radial Anzani engine has just been completed and successfully tested by the Lincoln Standard Aireraft Corp. of Lincoln, Nebr. This interesting little ship, which is illustrated herewith, was designed by, and built under the supervision of, S. S. Swanson of Vermillion, S. Dak., who is chief engineer of the Lincoln Standard company. Mr. Swanson will be remembered as the designer of several highly successful two-place and three-place sport planes which were described at the time of their appearance in these columns.

In producing this sport plane the Lincoln Standard company was prompted by the desire to put on the market a ship that would combine some of the high aerodynamic efficiency and the low fuel consumption generally found in light planes with a power plant more reliable than most motorcycle engines have proved to be. What a finely streamlined and yet sturdy ship has resulted from this endeavor is shown in the accompanying illustration. This result, together with the performance obtained—a high speed of 95 mi./hr., a low speed of 35 mi./hr. and a range of 250 mi.—affords another proof of Mr. Swanson's designing ability as well as of Lincoln Standard workmanship.

The new Lincoln Standard one-place Sport plane (35 hp. Anzani engine), built to the designs of S. Swanson by the Lincoln Standard Aircraft Corp. of Lincoln, Nebr.

Constructional Features

There are many new features in this little job. By the removal of seven bolts the plane may be dismantled and made ready for crating or storage in less than 30 min.

The entire tail unit is of welded steel tubing construction. The stabilizer is of symmetrical camber and detachable, while the rudder and fin are built into the fuselage, the fin projecting through on the lower side of fuselage so that there is a small fin exposed on the underside to which is attached the tail skid, this also being of steel and resting on the usual shock absorber cord.

The undercarriage is of steel tube construction with through axle. The struts are streamlined with balsa wood. 20 x 4 wheels are used. Width of axle is 4½ft.

Wings—The webs of the ribs are Bass wood with the usual lightening holes; capstrips are of spruce. Spars are of the routed I beam sections, also of spruce, and spliced in the center so that they are continuous through the whole span of the wing with a dihedral of 4 deg. Both planes are built in one continuous panel from tip to tip. The upper plane has a cut-away at the center over the cockpit, and is fastened to the center N struts with four bolts. The lower plane, which is a single panel, is fastened to the underside of fuselage with three bolts.

The ailerons are on the lower plane only, and aileron control wires run within the lower wing. The single I struts on each side of the interplane bracing are of built-up spruce laminations. Landing wires are single, flying wires are double, and all are 3/32 in. cable.

Fuselage—The fuselage is of the girder type, built of spruce, the longerons being of ash forward of cockpit. The cockpit has plenty of leg room for such a small machine. The rear end of fuselage tapers off into a horizontal wedge, the whole being nicely streamlined with a false work of basswood. The cowling is of 20 ga. aluminum.

A three hour duration gas tank is located between the fuselage and cowling just over the center of gravity. The 35 hp. Anzani engine is separated from the fuselage by an aluminum wall.

SPECIFICATIONS

Dimensions
- Span both wings, 20 ft.
- Chord both wings, 34 in.
- Gap between wings, 40 in.
- Stagger, 15 in.
- Length overall, 16 ft.
- Height, overall, 5 ft. 7 in.

Wings
- Wing curve, USA27
- Total wing area, 108 sq. ft.
- Angle of incidence, top wing, 1½ deg.
- Angle of incidence, bottom wing, 0 deg.
- Decalage, 1½ deg.
- Dihedral both wings, 4 deg.

Power Plant
- Engine, 30-35 hp. 3-cyl. Anzani.
- Propeller, 6 ft. dia.; 5½ ft. pitch.
- Propeller speed, 1500 r.p.m.

Tail Unit Areas
- Stabilizer area, 7½ sq. ft.
- Elevator area, 5½ sq. ft.
- Fin area, 3 sq. ft.
- Rudder area, 3 sq. ft.
- Aileron area, each 6 sq. ft.

Weights
- Weight empty, 370 lb.
- Weight loaded full load, 600 lb.
- Wing loading, 5½ lb./sq. ft.
- Power loading, 17 lb./hp.

Performance
- Maximum speed, 90 mi./hr.
- Cruising speed, 75 mi./hr.
- Minimum speed, 35 mi./hr.
- Range, 250 mi.
- Climb, 800 ft./min.
- Miles per gallon of fuel, 35.
- Factor of safety throughout, 11.

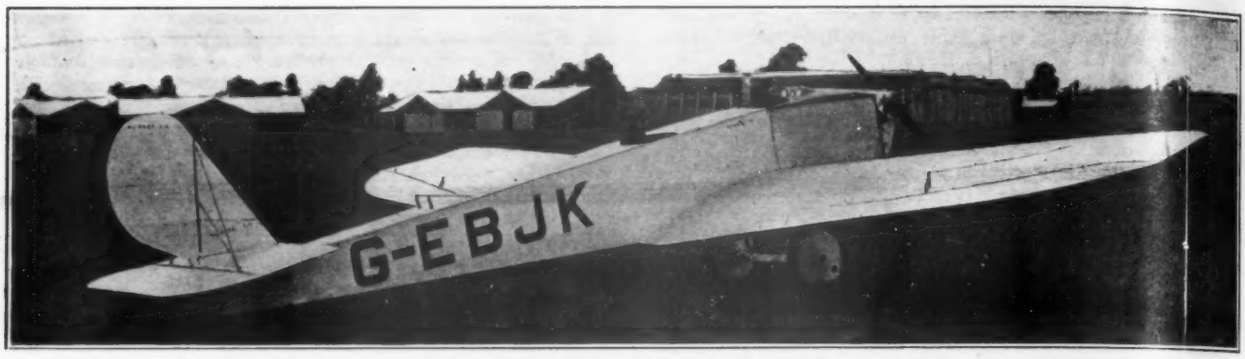
Finish—The plane is covered with Grade A linen, 5 coats of new nitrate dope and finished with Valspar varnish.

This Week's Cover Picture

This week's cover picture shows the 5,000,000 candlepower beacon located on Sherman Hill, in the Rocky Mountains, between Cheyenne and Laramie, Wyo. Being situated 8600 ft. above sealevel, this light which guides the Air Mail pilots on their nightly toil is the highest lighthouse in the world.

LIGHT PLANES AND GLIDERS

Edited by Edmund T. Allen



Bristol Brownie two-place light plane (Bristol Cherub engine). High speed 70 mi./hr.; landing speed 38 mi./hr.; cruising range 100 mi.

The Bristol Brownie Light Plane

The Bristol Brownie light plane with Bristol Cherub engine, won, it will be remembered, second prize in the two-place light plane competition held at Lympne, England, last September. This little ship was designed by Capt. S. F. Barnwell, who designed the Bristol Fighter of wartime fame, upon his return from Australia where he had spent some time on the staff of the Australian air force.

The Brownie elicited much interest at the Lympne meet on account of its being the only light plane embodying metal construction. The fuselage is a girder of steel tube longerons and struts, joined by sweated sleeve fittings and braced by piano wire except behind the engine mounting where tierods are used. The wings, which are of thick biconvex section at the roots, taper both in thickness and chord toward the tips and are set at a marked dihedral angle. The wing spars are attached to the root spars at the fuselage by a pin joint at the bottom, and by an adjustable joint at the top, of each spar. The covering of the fuselage is of fabric.

The landing gear consists of two vertical steel tubes which are wire braced to the fuselage and are joined at the bottom by an axle tube carrying two 750 x 70 mm. Palmer wheels. There is no shock absorbing device save that afforded by the tires and by the deflection of the axle which overhangs the vertical struts.

The tail unit is of steel tube framing, fabric covered.

Two sets of wings were built for the Brownie—one having steel spars and duralumin ribs and the other box spars of spruce and plywood, with Warren type ribs. The construction of the wooden wing is shown in the accompanying sketches. In the metal wing the spars consist of uniform top and bottom flanges which are tied together by a Warren bracing made from steel tubing, flattened at each end and riveted to the flanges. The latter have a shallow channel section. The ribs are also Warren girders, built of duralumin channel section.

The Cherub engine is mounted on four stiff steel pillars projecting from the forward bulkhead of the fuselage and screwed on the crankcase studs. These four supports are entirely unbraced.

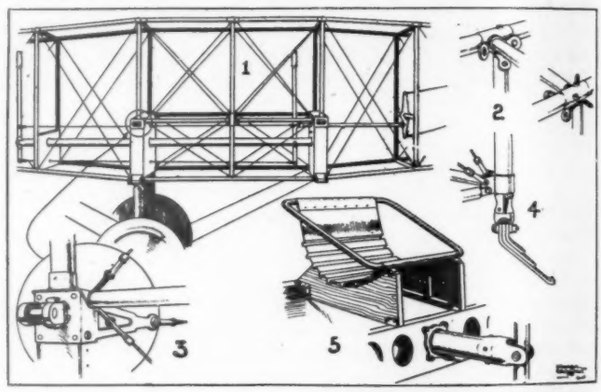
The fuel tank is housed in the fuselage fairing over the front seat. It contains 3.37 gal. giving about 1¾ hr. supply at a cruising speed of 58 mi./hr.

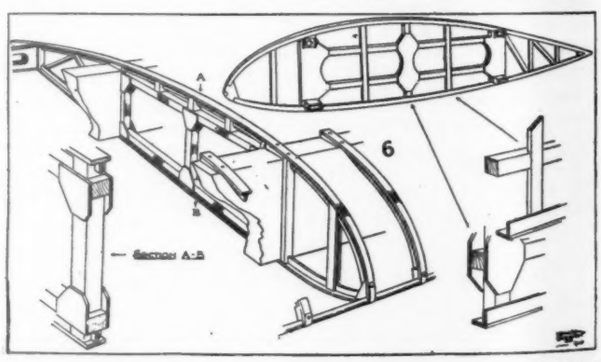
Following are the principal characteristics of the Bristol Brownie light plane. It should be noted that outline drawings giving also the various areas of this ship, were published in the Nov. 17, 1924, issue of AVIATION.

SPECIFICATIONS OF THE BRISTOL BROWNIE LIGHT PLANE

20 hp. Bristol Cherub Engine

Span	36 ft. 7 in.	High speed	70 mi./hr.
Length	26 ft. 3 in.	Cruising speed	58 mi./hr.
Height	6 ft. 8 in.	Landing speed	36 mi./hr.
Wing area	204 sq. ft.	Landing run	50 yd.
Weight empty	500 lb.	Take-off run	150 yd.
Weight loaded	870 lb.	Ceiling, full load	8000 ft.





Courtesy of *The Aeroplane*

Constructional details of the Bristol Brownie light plane—1, Parallel section of the fuselage, uncovered; 2, Steel tube joints of the fuselage; 3, Differential screw attachment of the front wing spar; 4, The tail skid; 5, The pilot's seat; 6, Wing construction, showing end and compression ribs

General Patrick on Air Travel

Maj. Gen. Mason M. Patrick, Chief of Air Service, believes that air transportation systems for passengers, mails and goods can, under proper conditions, compete for safety and reliability with the standards of railway train service or even surpass them. He made that statement at the 18th annual convention of the Association of Life Insurance Presidents in urging the life insurance companies to give consideration to the granting of insurance at regular premiums on the lives of travelers by air and the operators of aircraft, declaring also that such insurance would greatly aid the development of air transportation.

Following are some salient passages from General Patrick's address:

"The experience of the World War has convinced all who studied the matter that in future wars aircraft will play an important or possibly a decisive part. It is my firm opinion that an adequate air force is the best peace insurance policy that this country can obtain.

"That there are comparatively few casualties suffered by the Air Mail is marked evidence of the safety with which a well designated air route, one along which there are enough landing fields may be traversed. These Air Mail pilots flew over 2,000,000 mi. without a single fatality. On the Britsh and Dutch air lines during the past three years the average number of passenger air miles to each passenger fatality was 2,663,000. Prior to 1913 for a number of years there was an average of one passenger casualty on our railroads for about every 2,000,000 passenger miles.

"Air transportation has passed the experimental stage. The knowledge gained during the past six years has demonstrated incontestably that aircraft as agents of commerce have 'arrived.'

"During the five years from 1919 to Jan. 1, 1924, regular scheduled air transportation services have operated an aggregate mileage of over 20,000,000 mi. They have transported during this period a total of 121,496 passengers, 8,200,000 lb. of merchandise, and 7,145,000 lb. of mail.

"During the past three years the U. S. Air Mail Service in this country has transported over 4,000,000 lb. of mail along the transcontinental route between New York and San Francisco, with a loss of only five one-thousandths of one per cent. This may be compared with the percentage of registered packages lost in the United States during 1922, namely, seven and a half one-thousandths of one per cent.

"It is a simple matter to travel by air to practically all European capitals. The question is often asked why in this country, whose distances are so much greater, air transportation has not before this come into being. The answer is a simple one. The European countries have recognized more clearly than ourselves the military and the economic advantages of developing and promoting these air transportation companies. They therefore subsidize them.

"In this country we always balk at the word subsidy, and yet there is no method of transportation ever employed which has not been subsidized indirectly. Many of our railroad systems were given immense land tracts. The Federal Government today improves and lights waterways and harbors, while State and Federal agencies are spending money by the hundreds of millions of dollars in building roads for automobile traffic. So far nothing of this kind has been done for air transportation. With similar governmental supervision and aid there is no reason why air transportation will not be financially successful."

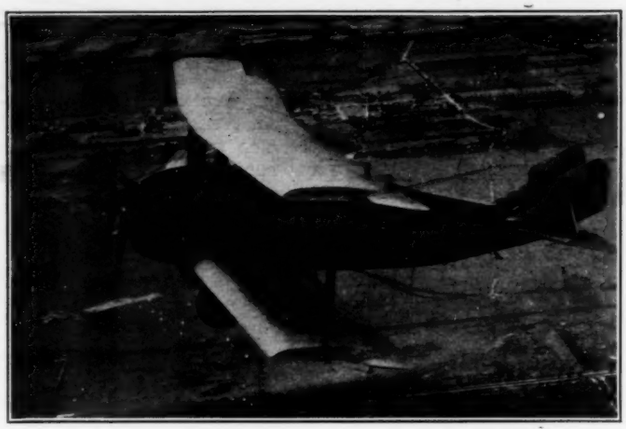
The New Remington-Burnelli Transport

Complementary to the general information published here some time ago regarding the new Remington-Burnelli (Model 2) Transport plane, we are now able to furnish some interesting design data on this interesting machine which was designed by Vincent J. Burnelli.

The RB2 which is shown in flight in the accompanying illustration, is a twin tractor biplane equipped with two 500 hp. Galloway Atlantic engines. The ship is entirely built of duralumin, including the covering of the wings and the fuselage.

Span and chord are equal for both wings, being 78 ft. by 10 ft. 6 in., giving an aspect ratio of 7.4 . The wing curve used is the USA27, instead of the M2 originally figured on. Both wings are set at an incidence of 2 deg. and are staggered, but while the top wing has no dihedral, the bottom wing has a dihedral of 1½ deg. The mean gap is 11 ft. 4 in. The total wing area is 1517 sq. ft., and the aileron area 119 sq. ft.

The wing construction is original, consisting of box type duralumin girders with lattice webs. The compression struts



Remington Burnelli model 2 Transport (2-500 hp. Galloway engines) in flight

are spaced approximately 6 ft. apart and conform to the wing contour. Between the compression struts, and fastened to them, are duralumin U section, spaced 2 ft. apart that run laterally. They are used to take the covering load and do away with the conventional rib construction. The covering or skin of the wing is of one ten-thousandth duralumin, 1¼ corrugated, 1¼ pitch and ⅜ deep, formed to the wing contour and riveted to the wing beams. The location of the wing beams in per cent of the chord to the rear of the leading edge is 19 per cent for the front beams and 69 per cent for rear beams. The length of the center section is 14 ft., that of the inner bay 18 ft. and that of the cantilever panels 14 ft.

The fuselage is remarkable for its airfoil section and for its unusual width which makes it possible to mount the two 500 hp. engines side by side in the nose. The construction of the fuselage is likewise of duralumin, riveted channel section struts being used together with a corrugated skin which contributes to the strength of the structure. The cargo space available is 14 ft. by 16 ft. by 6 ft. The tread of the landing gear is 13 ft. 9 in.

Following are the areas of the tail surfaces: Horizontal stabilizer 44 sq. ft., elevator 74 sq. ft., vertical fin 33 sq. ft., rudder 36 sq. ft. As may be seen from the illustration, the rudder and the fin are of biplane form. Both the elevator and the rudder are balanced. The stabilizer setting with reference to the propeller axis is zero.

The RB2 weighs empty 9450 lb. The weight of cargo and crew is 4000 lb., and that of fuel and oil 2150 lb., making a weight loaded of 15,600 lb.

Personal, not Company, Views

We have received a communication from R. R. Blythe, in which he states that the views he expressed in AVIATION with regard to air legislation were purely personal and represent neither the views of Harry Bruno and Associates nor the views of their aeronautical clients. Mr. Blythe signed the letter with his own name, and the name of the firm with which he is connected was added by the editor for purposes of identification.

When AVIATION asked individuals prominent in the industry for their views on aeronautical legislation we requested personal opinions rather than ones involving the policy of the concern with which the man might be connected.

AIRPORTS AND AIRWAYS

San Diego News

By Phil Sawyer

The airplane carrier and supply ship Langley arrived in San Diego harbor at 8 o'clock, Saturday morning, Nov. 29 from Hampton Roads via Pensacola. When the Langley was about 100 mi. off shore and 180 mi. south of San Diego, it discharged three torpedo planes. One was a CS1 type ship, the others being SDW1's. Lieutenant Crinkley flew one of the latter planes, which happened to be the holder of the world's endurance flight record of 20 hr., 10 min. This record was made in Washington, D. C. last October. When the Langley entered the harbor, it discharged ten more planes which flew around the city until the ship's arrival.

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A community flying field is being planned for San Diego. The present commercial field is being sub-divided into lots and as a new field will be necessary, the above plan has been suggested. It will greatly help aviation and will prove a boon to commercial fliers.

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Lieut. A. E. Dupuy and twelve men of the VO naval observation squadron have left for San Pedro after several months service at North Island. They will be stationed at the Medusa as part of the repair unit for seaplanes.

T. C. Ryan of the Ryan Flying Field has just completed a new Hisso-Standard 4-passenger cabin plane for his own use. This gives Mr. Ryan two planes of this type besides two instruction ships. H. Bowlues and D. Bowman constructed the ship.

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Howard E. Morin, a newspaper reporter of San Diego, was reappointed chairman of the National Aeronautical Committee of the Ninth Corps Area. This is the third time that Morin has held this position in as many years. The Ninth Corps Area includes California, Oregon, Washington, Idaho, Montana, Arizona, Utah and Alaska.

Martin Jensen reports good business at his field here. He recently rebuilt a Thomas-Morse pursuit plane, installing a Curtiss OX5 motor in place of a LeRhône. It makes it a good deal easier to handle and develops about the same speed and power, according to Jensen.

How Hadley Field was Discovered

That data obtained by civilian aviators on air navigation facilities are often very valuable and prove a big aid in the development of aviation has become very apparent during the past two weeks.

For a year or more officials of the Air Mail Service had been looking for a good landing field somewhere in New Jersey and adjacent to New York, with good facilities for train connection and motor trucks. Such a field has finally been obtained at Metuchen, N. J., and as everyone knows this is to be the eastern terminus of the Air Mail. The Post Office Officials figure that they will save a great deal of time on the Night Air Mail Service and also will make the flying of the mail a great deal safer due to the fact that the pilot will not have to fly over New York any more.

This field, now called Hadley Field, was first discovered by a civilian aviator, Capt. R. H. Depew, Jr., Vice President of the Fairchild Flying Corp., New York City. Four years ago Captain Depew was flying over New York City, distributing pamphlets for a film company, when his gas supply ran out and at the same time sudden sea-fog enveloped his machine. He came out of the fog over some rather flat country and noticed a very fine field adjacent to a railroad track. He made a good landing on this field and when its owner, a farmer, arrived asked for some gasoline and also where he was. The farmer told him that he was at Metuchen,N. J., and that the town he saw nearby was South Plainfield. As a result of Captain Depew's discovery this field has been used from time to time by civilian aviators who have been on commercial flights around New Jersey. In particular, C. S. ("Casey") Jones of the Curtiss Exhibition Co. is one of the men who has used this field to great advantage, particularly when he had been photographing the football games of Princeton.

Dallas (Tex.) News

At a recent weekly luncheon of the Dallas Flying Club, a committee was appointed to interview the city authorities and the Chamber of Commerce in an effort to enlarge the Municipal Flying Field. The present field consists only of 80 acres, but by using adjacent land the larger type of airplanes can land and take off. However, the industrial development of Love Field will soon interfere with this and the city will be asked to lease additional land.

All who are interested in aviation are cordially invited to become members of the Dallas Flying Club. There are no dues and a weekly luncheon is served every Friday at 12:15 at the Y.W.C.A. at cost.

The officers of the Dallas Flying Club are: B. B. Owen, president; Maj. S. C. Coon, 1st vice president; Roy A. Nelson, 2nd vice president; Capt. Jack G. Freeze, secretary, and Lieut. C. W. Cahoon, Jr., treasurer. To these men and the Committee on Arrangements is due the well earned credit of putting over the largest and most successful demonstration of the airplane to be held in Dallas since the war, and the support and interest with which Dallas responded bids fair to the claim that Dallas will be recognized as the "Air Center" of the Southwest.

Long Photographic Flight

A 4000-mi. photographic flight was recently completed by E. P. Lott, pilot for the Fairchild Flying Corp., when he landed at Curtiss Field, Mineola, N. Y. Pilot Lott, who used a Huff Daland Petrel-5 (200 hp. Wright "Tempest" E4 engine, on this extended flight started from Dayton, Ohio, whither he had flown last October as a contestant in the On-to-Dayton Race, and successively landed at Toledo, Detroit, Chicago, Kenosha, Wis.; Peoria, Ill.; Bloomington, Ill.; returing to Dayton. His second circuit took him to Columbus, Marion, Manfield and Warren (Ohio); Franklin, Middletown, Lebanon and Bethlehem (Penn.), from where he returned to Mineola by way of Philippsburg, N. J.

No trouble whatever was encountered en route from either plane or engine, both of which functioned perfectly throughout. Pilot Lott has since started on another photographic flight which will take him over several states.

Spokane News

By E. H. Partridge

Flying his Fokker monoplane 3500 mi. through snow, fog and rain from Mexico City, Mexico, Jack Dean landed in Spokane recently and spent one day here on business. His trip required about four days of flying. On the return trip he took A. W. Ducolon as passenger to San Francisco, from where Dean will make the remainder of the trip alone. He found no bad weather in the Inland Empire region.

During the war Dean served with the First Aero Squadron, and now he is in commercial airplane business in Mexico. He said he is studying possibilities of obtaining mail contracts.

• • •

Two reinforced concrete hangars for the Ninth Corps aerial observation unit of the National Guard are practically complete. Much improvement work is being done on the city's municipal field to make it suitable for the work of the unit.

Planes for the unit are expected to arrive by Jan. 1.

Yackey Aircraft Reports Good Year

The Yackey Aircraft Co. of Chicago, in a communication to AVIATION, reports a very satisfactory business year.

As a result of the fine showing made by Yackey Sport planes at the Dayton and Wichita air meets, eleven of these ships have been sold to private individuals, as follows: Art Roza of Chicago; Dan Kiser and Gil Meisenheimer (one ship each) of Milwaukee; R. K. Peck of Elgin, Ill.; Rodgers Quimby of LaGrange; McBrien Bros. of the Lake Geneva Aviation Co.; Harry Mugridge of Chicago, O. M. Goodsell of Grand Rapids, Mich.; H. F. Booth of Chicago; Walter Hagar of Maywood, Ill., and Amos Meyer of Chicago.

Since taking over Checkerboard Field, on Oct. 8, fourteen students were soloed, which brings the total number of men who received flight instruction during the year to 162. Some of these had never ridden in an airplane before, but a great many of them had had previous flying experience, though these were either not familiar with the Yackey Sport or had laid off flying since the war. The instruction of the students is in the hands of Hans Hoyte, chief pilot of the firm, who has been connected with Yackey Aircraft for the past eleven years. It is of interest to mention here that every employee of this firm is a pilot, which is probably a unique record in aviation.

The rapid growth and continuing success of this company is due in the first part to the unflagging enthusiasm and energy of its owner, "Tony" Yackey, and secondly to the fact that—as he writes—he insists on running the business with the assistance of the employees rather than in spite of them.

Albert Hamar, superintendent of the Yackey factory, has been connected with the firm for six years and is considered both a capable engineer and an excellent pilot. He is assisted by Charles Priest, formerly assistant field manager at Checkerboard Field and a well known pilot of both heavier-than-aid and lighter-than-air craft. James Donelly, formerly with the Goodyear Aeronautic Department, is in charge of the motor department. This force, together with four mechanics, Hamar's crew, is turning out Yackey Sports at the rate of one in six days. Robert Rodell, a well known exhibition flier, is in charge of field operations.

Capt. C. P. Reyes, who was sent over here from the Philippines to study commercial aviation, is still very active at the field. Art Tallman, who has been connected with Yackey for four years as a pilot, has just returned after completing a tour of the South, photographing power lines in Tennessee, and he has since been kept busy doing cross country flights.

Since moving to Checkerboard Field, the Yackey company has completed a new three-place passenger carrying plane which is powered with an OXX6 engine, has dual control and ample seating space. The new ship has an unusually good performance, part of which is attributed to the Curtiss-Reed metal propeller with which it is fitted. Fully loaded this ship will take off in still air in 180 ft. and it has a very rapid climb. High speed has been sacrificed to have a safe passenger carrier to work out from small fields.

Regarding commercial profits, Mr. Yackey writes: "The two ships which we had at the Dayton races have paid for themselves seven times over since they were built, the first of this year. The oldest one of the two took in $345 last week, $175 of it in a night cross country trip carrying pictures from the Nebraska game to Chicago to catch the night mail going West. Although we were not from New York, we got $1700 prize money at Dayton, and $500 at Wichita with a ship that only sold for $1275."

Mr. Yackey incidentally wishes to call the attention of the readers of AVIATION that in a table giving the results of the On-to-Dayton race, he was erroneously put down as having flown a Laird Swallow, when, as a matter of fact, he flew a Yackey Sport, as was correctly stated in our race story.

Education via Airplane

Charles T. Wrightson recently arrived at Oregon Agricultural College from Fresno, Calif., where he is registered as a freshman. He is a commercial flier and has conceived the novel idea of bringing his plane to school with him and taking up passengers during his spare time to pay his college expenses.

Dayton News

By Maurice C. Hutton

Until someone shows the War Department how to apportion three airplanes among half a dozen cities, the world flight cruisers will remain in a hangar at McCook Field. It is understood that the Boston II will be turned over to the Engineering Division for navigation tests.

* * *

Lieut. Harry Johnson, who was injured during the Dayton air races when his plane dove between two houses north of the city, has returned to duty at McCook Field. He is chief of the Planes and Maintenance Section.

* * *

George B. Smith, secretary of the executive committee, International Air Races, Inc., has received a letter from Mrs. Gertrude Skeel, widow of the late Capt. Burt E. Skeel, expressing her appreciation of the sympathy shown by the committee. The letter also thanked the committee for the gift of $1,000 which was sent her after the races.

* * *

Maj. A. W. Robins, commanding officer of Wilbur Wright Field and the 5,000 acre site donated by citizens of Dayton to the War Department, has converted the new ground into a game reserve. Hunting is forbidden on it by any but Air Service officers on the post.

* * *

Etienne Dormoy, McCook Field engineer, and designer-builder-pilot of the "Flying Bathtub," will build another light plane for the 1925 races as soon as specifications are made known. In the meantime he plans a visit to France to attend the international aeronautic exhibition and see his parents.

Rohrbach Flying Boat Makes World Records

Several new world records were made recently in Denmark with Rohrbach RoII twin-engined flying boat which is illustrated elsewhere in this issue. The plane was piloted by Herr Lesch in all of these record flights except in the flights for distance and duration with 1000 kg. useful load, when Herr Landmann was the pilot. The list of these records, as recognized by the F.A.I. is as follows:

Distance with useful load of 1000 kg.—422 km.

Duration with useful load of 1000 kg.—3 hr. 17 min. 14 sec. (Copenhagen, Sept. 20, 1924.)

Distance with useful loads of 250 kg. and 500 kg.—1102 km.

Speed over 500 km.—156.7 km./hr.

Speed over 1000 km.—152.3 km./hr.

Speed with 250 kg. and 500 kg. Useful Load—159.1 km./hr. over 100 km., 158.8 km./hr. over 200 km., 156.7 km./hr. over 500 km., 152.3 km./hr. over 1000 km. (Copenhagen, Oct. 24, 1924.)

The above speed record over 500 km. was since broken at the Baltimore Naval Air Pageant by Lieutenant Ofstie, who made a speed of 259.3 km./hr. Lieutenant Henderson, at the same meet broke the world duration record for 1000 kg. useful load by staying up 5 hr. 28 min. 43 sec.

Amsterdam-Batavia Flight Completed

The pioneering flight undertaken by the Royal Dutch Air Line (K.L.M.) from Amsterdam to Batavia, Java, was successfully completed on Nov. 24.

Mr. Van der Hoop, the pilot of the Fokker F7 commercial plane (360 hp. Rolls-Royce Eagle engine) used on this flight made rapid progress on the latter stages of the journey. Leaving Karachi, India, on Nov. 10, he reached Ambla the next day, Allahabad on the 12th, Calcutta the 13th, Akyab the 14th, Rangoon the 15th, and Bangkok, Siam, the 16th. There two days were spent in overhauling the ship, and on Nov. 21 Van der Hoop pushed on, reaching the same day Medan, Sumatra. From there he proceeded to Munkok the following day, and on the 24th he arrived at Batavia, where the government and the population extended the crew a warm welcome.

The distance of 15,000 mi. from Amsterdam to Batavia was covered by the Dutch airmen in 27 days, excluding the twenty-eight days' forced stay at Philippopolis, Bulgaria, which was due to nosing over in a rice field.

UNITED STATES AIR FORCES

U. S. ARMY AIR SERVICE

Distribution of Air Service Units

The following distribution of Air Service Units has come into effect on Nov. 12, 1924:

Bolling Field, Anacostia, D. C.
- 99th Observation Squadron (R.S.)
- 56th Service Squadron (R.S.)
- 3rd Photo Section
- Headquarters Squadron

Brooks Field, San Antonio, Tex.
- Primary Flying School, organized as
  - 11th School Group, consisting of
    - Headquarters, 11th School Group
    - 46th School Squadron
    - 47th School Squadron
    - 62nd Service Squadron

Chanute Field, Rantoul, Ill.
- 15th Observation Squadron (R.S.)
- 5th Photo Section
- Technical School

Crissy Field, San Francisco, Calif.
- 91st Observation Squadron
- 15th Photo Section

Fort Bliss, El Paso, Tex.
- 12th Observation Squadron (less Detachment at Fort Sam Houston, Tex.)
- 1st Photo Section

Fort Bragg, Fayetteville, N. C.
- Detachment of 22nd Observation Squadron

Fort Leavenworth, Kan.
- Detachment, General Service School

Fort Sam Houston, San Antonio, Tex.
- 24th Photo Section
- Detachment from 12th Observation Squadron

Kelly Field, San Antonio, Tex.
- Advanced Flying School, organized as
  - 10th School Group, consisting of
    - Headquarters, 10th School Group
    - 40th School Squadron
    - 41st School Squadron
    - 42nd School Squadron
    - 43rd School Squadron
    - 68th Service Squadron
    - 70th Service Squadron (Attached)
    - 22nd Photo Section
  - 3rd Attack Group, consisting of
    - Headquarters, 3rd Attack Group
    - 8th Attack Squadron (R.S.)
    - 90th Attack Squadron (R.S.)
    - 60th Service Squadron (R.S.)

Langley Field, Hampton, Va.
- 2nd Wing, consisting of
  - Headquarters, 2nd Wing
  - 2nd Bombardment Group, consisting of
    - Headquarters, 2nd Bombardment Group
    - 11th Bombardment Squadron
    - 20th Bombardment Squadron
    - 49th Bombardment Squadron (at Phillips Field)
    - 96th Bombardment Squadron
    - 59th Service Squadron (less det. at Phillips Field)
    - 2nd Photo Section
  - Tactical School
  - 50th Observation Squadron (R.S.)
  - 19th Airship Company
  - 58th Service Squadron (R.S.)
  - 20th Photo Section

Marshall Field, Fort Riley, Kan.
- 16th Observation Squadron (R.S.)
- 9th Photo Section

Maxwell Field, Montgomery, Ala.
- 22nd Observation Squadron (less det. at Fort Bragg)
- 4th Photo Section

Mitchel Field, L. I., N. Y.
- 9th Observation Group, consisting of
  - Headquarters, 9th Observation Group
  - 1st Observation Squadron (R.S.) (attached)
  - 5th Observation Squadron " "
  - 61st Service Squadron
  - 8th Photo Section (attached)
  - 14th " " "

Phillips Field, Aberdeen, Md.
- 49th Bombardment Squadron (det from 2nd Bomb. Grp. Langley Field)
- Detachment of 59th Service Squadron
- 18th Airship Co.

Post Field, Fort Sill, Okla.
- 44th Observation Squadron (R.S.)
- 23rd Photo Section

Scott Field, Belleville, Ill.
- Balloon and Airship School, organized as
  - 21st Airship Group, consisting of
    - Headquarters, 21st Airship Group
    - 8th Airship Company
    - 9th Airship Company
    - 12th Airship Company
    - 24th Airship Service Company
    - 21st Photo Section

Selfridge Field, Mount Clemens, Mich.
- 1st Pursuit Group, consisting of
  - Headquarters, 1st Pursuit Group
  - 17th Pursuit Squadron
  - 27th Pursuit Squadron
  - 94th Pursuit Squadron
  - 95th Pursuit Squadron
  - 57th Service Squadron

Wilbur Wright Field, Fairfield, Ohio
- 88th Observation Squadron (R.S.)
- 7th Photo Section

Hawaiian Department
- 5th Composite Group, consisting of
  - Headquarters, 5th Group
  - 6th Pursuit Squadron
  - 19th Pursuit Squadron
  - 23rd Bombardment Squadron
  - 72nd Bombardment Squadron
  - 65th Service Squadron
  - 11th Photo Section
- 4th Observation Squadron
- Hawaiian Air Depot

Panama Canal Department
- 6th Composite Group, consisting of
  - Headquarters, 6th Group
  - 7th Observation Squadron
  - 24th Pursuit Squadron
  - 25th Bombardment Squadron
  - 63rd Service Squadron
  - 13th Photo Section

Philippine Department
- 4th Composite Group, consisting of
  - Headquarters, 4th Group
  - 2nd Observation Squadron
  - 3rd Pursuit Squadron
  - 28th Bombardment Squadron
  - 66th Service Squadron
  - 6th Photo Section

The enlisted personnel in these units totals 8760, including 196 Flying Cadets.

Radio Compass Test Flight

A radio compass, perfected after long experiment by the Air Service and Signal Corps to overcome the handicap of low visibility in flying, was given its first practical test on Nov. 27 in a flight between the airway stops of Dayton, Ohio, and Moundsville, W. Va., by Lieut. George W. Goddard. The results are viewed as having an important bearing on the practice of flying in fog and clouds.

While a constant stream of signals flowed between the radio towers at the two places, Lieutenant Goddard, flying in a haze, and without attempting to guide by landmarks, was kept on a virtual beeline route by a special receiving apparatus that told him when he was sliding off his course.

When he was on the straight course he heard only dashes in the signaling between the towers. When he got off to the left he was warned by hearing a dash and then a dot, repeated at intervals of ten seconds. Similarly, a dot and a dash signal warned him when he was swerving too far to the right.

Lieutenant Goddard wore a specially-designed helmet, tight fitting and equipped with earphones and, the plane as an aerial carried a wire 300 or 400 ft. in length, held down by a weight.

The receiving set on the plane was grounded to the motor, and the plane was equipped with long exhaust pipes to remove the sound of the motor so the pilot could hear the signals.

Coast-to-Coast Flight in 12 min.

Another unofficial speed record was established in the Canal Zone by France Field fliers when Lieutenants Reid and Kennedy, in standard equipped MB3 Pursuit planes (Wright 300 hp.) flew across the country from coast to coast at the speed of 180 mi./hr., covering the distance of 36 mi. in 12 min.

Changes in Station

The Adjutant General's Office announces that the 31st Air Intelligence Section at Mitchel Field, N. Y. has been demobilized and that the 20th and 22nd Balloon Companies have been made active associates of the 19th Balloon Company.

Night Flight of 2nd Bombardment Group

The recent night cross-country flight of the 2nd Bombardment Group from Langley Field, Va., to Mitchel Field, L. I., New York, was the first maneuver of this kind in this country ever attempted with a considerable number of large planes. The flight demonstrated the feasibility of a quick change of base by the Bombardment Group on short notice at night from Langley Field to any place along the Atlantic Coast in time to take part in a bombing mission early in the morning.

Nine Standard NBS1 and MB1 airplanes (Martin Bombers) of the 11th, 20th and 96th Bombardment Squadrons were led in a 9-plane formation, consisting of three-plane flights, by the Group Commander, Maj. J. H. Pirie. The personnel in each plane consisted of two officers (a pilot and a navigator) and two enlisted men (mechanic and a radio operator). Each plane was equipped with the following accessories as aids for night flying.

Navigation lights—red and green on wing tips, white on tail.

Parachute flares (new type)—four per plane.

Wing tip flares—one minute and two minute flares, four per plane.

Landing lights (electric)—two per plane.

Signals within flights consisted of blinking of navigation lights to indicate turns and other maneuvers. Communication within the formation was obtained by radio. The leader of each flight and the Group Commander employed SCR 159 set or 68 set for reception.

The flight from Langley to Mitchel Field was via Cape Charles, Va.; Cape Henlopen, Del.; Cape May, N. J., and Sandy Hook, N. J. The following emergency fields were designated before the flight, and all pilots were informed as to their approaches and landing facilities: Snow Hill, Del.; Lewes, Del.; Cape May, N. J.; Lakehurst Naval Station, N. J., and Camp Alfred Vail, N. J.

All the planes reached their destination, although five forced landings were made. Two planes were compelled to turn back to Langley Field, two made a forced landing at Cape May, N. J., and one made a forced landing at Lakehurst, N. J. Both types of flares were used in connection with electric landing lights in making all landings, and all landings were successfully made.

The personnel making the flight to New York were greatly pleased with the functioning of the flares. One failure of a parachute flare to release from the plane was noted. The failure of the flare to leave the plane was not discovered until the morning after landing at Mitchel Field, when an examination of the plane disclosed the fact that the releasing fork had been withdrawn, the release spring had opened out but one of the studs holding the cover to the case had failed to disengage, so that the cover could not drop off and allow the parachute and flare to leave the case.

In the case of the forced landing at Lakehurst, the pilot released one flare to make a landing, but on attempting to release a second failed to get any results after pulling the releasing cables on all three of the remaining flares. These failures to release, however, were found to be due to faulty adjustment of the release cable.

San Antonio Air Depot Still Busy

The Engineering Department of the San Antonio Air Intermediate Depot, located at Kelly Field, Tex., in charge of Lieut. Clements McMullen, A.S., completely overhauled and repaired during the month of October the following airplanes and engines:

Airplanes—Nine DH4B, ten DH4M1, thirteen JN6H1, two MB3A, one SE5E, one TW3.

Engines—Forty-eight Liberty 12A, nineteen Wright-1 fifteen Wright-E and four Wright A-2.

Kindley Field News

The new Commanding Officer of the Coast Defenses of Manila and Subic Bay, Gen. Campbell King, is taking a personal interest in the welfare of Kindley Field. He has succeeded in having a speed boat assigned to this field. This boat was desperately needed. During the past year no boat was available, and at least one seaplane was a total loss due to this fact, to say nothing of risking life unnecessarily.

Mitchel Field Personnel Unveil Tablet

Personnel of Mitchel Field, L. I., N. Y., on Nov. 16, had the honor of unveiling a bronze tablet erected at Merrick, L. I., in commemoration of the service of the citizens of Merrick in the World War. The 61st Service Squadron attended as an organization, and the principal address was made by the past commander.

Maj. Robert T. Rasmussen, a retired Cavalry officer, was another speaker. Major Rasmussen is a distinguished friend of the Field, and as an index of his friendship all members of the command are admitted free, in uniform, to the handsome theater which he owns and operates at Freeport, a town adjacent to Mitchel Field.

Albrook Field

The War Department announces that the Balboa Fill Landing Field, Canal Zone has been designated as "Albrook Field," in honor of First Lieut. Frank P. Albrook, Air Service, who died Sept. 17, 1924, from injuries received in an airplane accident Aug. 12, 1924, at Chanute Field, Ill.

U. S. NAVAL AVIATION

Plans for the Shenandoah

Plans for a cruise of the Navy airship Shenandoah with the fleet during the Spring maneuvers in Hawaiian waters next year may have to be revised because of the limited present cruising capacity of the ship.

As now equipped, the Shenandoah has a cruising radius of about 2,500 mi. without refueling, and it is understood that during the recent conference to plan for the employment of the ship during the next few months some of the experts raised the question whether it would be wise to send the big airship to Hawaii.

A project to increase the fuel capacity of the Shenandoah to widen her cruising radius by 1,000 to 1,500 mi. is being considered by the Bureau of Aeronautics. The ship now is operated by five motors developing 300 hp. each, and one suggestion is that they be replaced with three 600 hp. geared-drive motors, which have a very much reduced weight in comparison with the power produced. This difference in weight would increase the capacity of the ship to carry fuel.

It seems unlikely, however, that these alterations could be made in time to permit the Shenandoah to take part in the fleet maneuvers in Hawaiian waters.

Final decision will be made by Secretary Wilbur, who is very anxious that the Shenandoah operate with the fleet during the maneuvers.

Naval Air Orders

Lt. (jg) William H. Buracker, det. Aircraft Sqds., Setng. Flt.; to Naval Air Station, Pearl Harbor, T. H. involving flying.

Lt. Comdr. James C. Monfort, det. Aircraft Sqds., Setng. Flt.; to Gen. Insptr. Naval Aircraft, Eastern Dist., New York.

Lieut. Thomas A. Gray, det. Aircraft Sqds., Setng. Flt.; to Nav. Air Station, Coco Solo, Canal Zone, involving flying.

Lt. Comdr. Cecil Y. Johnston, det. Aircraft Sqds. Setng. Flt.; to Naval Air Squadron, N.O.B., Hampton Rds., Va.

Lt. Comdr. DeWitt C. Ramsey, to Naval Air Station, Pensacola, for such duty involving flying as may be assigned.

Five Killed in Seaplane Accident

Five officers and men of the Aircraft Squadrons, Battle Fleet, were killed on Dec. 10 at San Diego, Calif. in one of the worst accidents in Naval Aviation annals.

They were hurled in the ocean when the huge, twin-engined, H16 type of seaplane in which they had been engaged in machine gun practice went into a spin from a height of about 1,200 ft.

All five of the men who were in the forward cockpit were killed instantly, it is believed.

The dead are: Lieut. Geochino Varini, pilot; Lieuts. Kilburn H. Roby and Arthur P. Thurston, assistant pilots; Fred D. Cruell, av. mach. mate; and J. Wieczk, 1st. cl. radio man.

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U. S. AIR FORCES—*Cont'd*

The injured comprise H. R. Davenport, av. mach. mate; J. D. Massingill, av. rigger; and R. Pautz av. mach. mate.

It will be hard, aviation officers said to discover the exact cause of the accident. Most of what is known concerning the tragedy came from Lieut. Joseph P. Gowan, who was in command of the seaplane which towed the target at which the H16's gun was directed in practice.

He states that Lieutenant Varini was trying to make a right vertical turn while the H16 was going at the rate of about 85 mi./hr. The seaplane then was about half a mile southwest of Point Loma, at the entrance of San Diego Harbor, and only a short distance from North Island, headquarters of the naval aviation forces.

Suddenly the big flying boat went into a spin and in a few seconds had crashed into the surf.

Lieutenant Varini was born in Genoa, Italy, of Austrian parents, on June 6, 1883. During the World War he was attached to an American seaplane unit operating on the Italian front. He entered the Naval Aviation Service as an officer in November, 1921. He then was living in the District of Columbia.

Lieutenant Thurston was born in Canada on Oct. 27, 1895, and was appointed to the Naval Academy from New Jersey on June 15, 1910.

Lieutenant Roby was born in Illinois on Oct. 23, 1898. He was appointed to Annapolis from that State on June 17, 1913. Before entering the aviation service he was attached to the destroyer Jacob Jones.

A board of inquiry to determine the cause of the accident has been ordered convened by Capt. Stanford E. Moses, commanding the Aircraft Squadrons, Battle Fleet.

Davenport and Massingill are said to have about an even chance for life.

PUBLISHER'S NEWS LETTER

In speaking of operating the air routes of the future, there seems to be a general tendency to place the work of inaugurating these lines on the backs of the aircraft constructors. They have been blamed for not producing commercial aircraft comparable to European air liners and for not operating regular air services.

Without giving the matter deeper study, it might seem to be a logical deduction from the premise that as our aircraft builders need orders they should take the chance of building commercial craft and operating them. The faulty character of this reasoning becomes apparent when other fields are considered. The manufacturers in other lines do not operate their own transportation products.

* * * *

Take water transportation as the first example. No one has ever heard of a shipbuilder running his ships on a sea route. Ferry boat builders do not attempt to gather large profits by building boats and operating them across short water crossings. And yet, every argument that applies to aircraft has similar application to shipping. The shipbuilder can build vessels to fit any need. He understands the operation of the mechanical parts better, perhaps, than any crew that could be secured. He has access to information as to the sea routes that are the most profitable. And still, with the delivery of the ship to the operating company the shipbuilder's part of the cycle is complete until repair work is required. The analogy should bring to mind helpful suggestions as to the future of commercial air navigation.

* * * *

Next, consider the railways. Do the builders of locomotives or of railroad cars operate their rolling stock? Yes, in one instance, which is the exception that proves the rule. The Pullman Company does build and operate its cars. The reason for this has a background that is not necessary to peer behind, except to mention that the Pullman company has never operated its cars as complete trains. When considering the vast expansion of railway transportation, the names of farseeing pioneers always come to mind. The Hills, Vanderbilts, Harrimans, and others of lesser opportunities but equal daring have been the forces that have given to the world railway transportation. In considering the wealth acquired by the pioneers in any transportation enterprise, it is the operator who has always taken the great profits.

* * * *

Similar procedure has been followed in other fields of transportation—the electric railway, the automotive truck and bus lines and, in fact, in all transportation the great development has come only after the *operator* had made his appearance and has told the manufacturer what he needed for his particular venture. Then the designer and constructor commenced to build on the basis of improved speeds, lower cost of operation, greater durability and more convenience, not to mention luxury. If the transportation development of the world had been left to the builders of equipment it would have been a slow process.

In seeking for a solution of the aircraft problem this fundamental principle should be recognized and acknowledged. Then, and then only will the aircraft industry and those interested in the development of commercial aeronautics begin to look toward the East for the dawn of the day of commercial air transportation.

* * * *

From another viewpoint this conception of the future is sound. Bankers are very hard in their surveys of manufacturing enterprises, when the demand must be created by the operating of the product of the company. The risk is doubled. Given a business with a reasonable demand, a banker will give a friendly ear to its possibilities, but when he has to speculate on operation also, the element of uncertainty makes the financial prospect seem dubious. Strange as it may appear, the same banker will consider a transportation project, without manufacturing entanglements, in the light of past experiences. He then assumes certain performance qualities of the vehicle and proceeds from that point to base his calculations on other elements. Bankers have vision where operation is concerned, but they are extremely practical where manufacturing is concerned. So, from the viewpoint of interesting capital in air transportation, the sharp division of manufacture and operation of aircraft seems to be wise.

* * * *

In the beginning there may be an opposite trend. Operators without manufacturing experience and a full knowledge of costs may try to make their own equipment. This method will inevitably fail when the business becomes sufficiently large to enable the aircraft industry to produce on a production basis. The other danger that comes from manufacture and operation in a single company is the customary dominating influence of one or the other. Either the engineers desire to experiment and the production department keeps costs up, or the operating department blames all of its shortcomings on engineering. A continuous "passing the buck," which is the chronic pastime in aeronautics, takes place to the ultimate disadvantage of the whole art.

Keeping in mind some of these basic ideas may aid those concerned in reaching the conclusion that the great development of the future in aeronautics will come from without the present circumscribed industry. Recognizing this fact may help in bringing into aviation new interests.—L.D.G.

A Triumph of Endurance

ON Friday, October 3rd, seven Army planes raced at Dayton, Ohio. The race was won by a Martin Bomber more than six years old. Before it came to the racing field this Martin Bomber had traveled over 350,000 air miles—more than 14 times the distance around the world.

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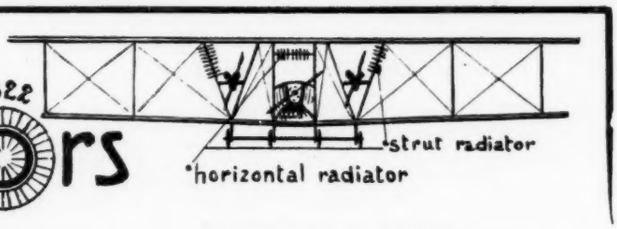

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